

AN EXPERIMENTAL STUDY OF SPEED AND OTHER FACTORS IN "RACIAL" DIFFERENCES

BY
OTTO KLINEBERG, M.A., M.D.

ARCHIVES OF PSYCHOLOGY

R. S. WOODWORTH, Editor

No. 93

28-13235

NEW YORK

Jan., 1928

BF
21
A7
no. 93

AN EXPERIMENTAL STUDY OF SPEED AND OTHER FACTORS IN "RACIAL" DIFFERENCES

BY
OTTO KLINEBERG, M.A., M.D.

ARCHIVES OF PSYCHOLOGY

R. S. WOODWORTH, EDITOR

No. 93

NEW YORK

Jan., 1928

21
A7
no. 93

ACKNOWLEDGMENTS

Acknowledgments are gratefully made to the various persons who kindly assisted in obtaining subjects for this investigation, and whose names are mentioned in the text; to Mr. Louis E. King for his very valuable cooperation in connection with the West Virginia Negroes; to Professor H. E. Garrett for helpful suggestions, especially with reference to statistical procedure; to Professor A. T. Poffenberger, Jr., and to Professor C. J. Warden for important criticisms; to Professor Franz Boas, who was largely instrumental in making this investigation possible, and whose critical approach to the problem of psychological differences between races did much to clarify and define the writer's point of view; and to Professor R. S. Woodworth, who directed the investigation, and whose advice and criticism were always of the greatest value.

Acknowledgment is also made to the Columbia University Council for Research in the Social Sciences for a grant of money which helped to defray the expenses of the field work involved in this study.

CONTENTS

CHAPTER	PAGE
I. Introduction.—Non-Racial Factors in “Racial” Differences	5
II. The Yakima Indians	27
III. The New York Negroes	46
IV. The West Virginia Negroes	57
V. The Haskell Indians	72
VI. A Learning Test	82
VII. The Problem of Speed	92
VIII. Conclusions	107

6 Feb. 1915

An Experimental Study of Speed and Other Factors in “Racial” Differences

I. INTRODUCTION

NON-RACIAL FACTORS IN “RACIAL” DIFFERENCES

1. THE PROBLEM

The experimental approach to the study of psychological differences between races has yielded a mass of evidence which seems to demonstrate the intellectual superiority of white over colored groups, as well as of certain white groups over others.* The superiority, as shown by tests of “general intelligence” and of specific abilities, has often appeared to be clear and well defined, and there has been some tendency among psychologists to regard it as proven. On the other hand, criticism, of both a logical and an experimental nature, has not been lacking. Many anthropologists† and psychologists have pointed out that there is a whole complex of factors, independent of race, which may account for the observed differences, and that we have no right to accept the hypothesis of the innate superiority of any one race over any other until these factors have been excluded.

One investigator states the problem as follows.‡ “The elements in a study of racial mental similarities or differences must be these: (1) two so-called races R_1 and R_2 , (2) an equal amount of educational opportunity, E , which should include social pressure and racial patterns of thought, and (3) psychological tests, D , within the grasp of both racial groups. We should have as a result of our experiment R_1ED equal to, greater than, or less than R_2ED . In this experiment the only unknown elements should be R_1 and R_2 . If E could be made equal the experiment could be worked.” It need only be added

* For a review of the literature, see Garth (28) and Woodworth (83).

† Notably Professor Franz Boas and his former pupils.

‡ Garth. See Reference (23).

that in any strict sense this experiment has so far been impossible.

Many attempts have been made, however, varying widely in direction and technique according to the particular investigator's view of what constituted "equal educational opportunity." From a consideration of these attempts there emerge several non-racial factors which may contribute to what seem to be "racial" differences. These factors do not necessarily exhaust the list, but they are probably the most significant, and certainly the most obvious. Some of the more important experimental investigations in which they are involved are summarized in the following pages.

2. THE FACTOR OF LANGUAGE

There is ample evidence that lack of familiarity with the English language contributes to the difficulty of intelligence tests for children of foreign white groups, although the estimate as to the amount of the contribution varies considerably.

Burt (8) believes that educational and particularly linguistic attainments affect the result with Binet-Simon tests "more profoundly than any other factor measurable with exactitude." Pintner and Keller (61) gave a revision of the Stanford-Binet test, the Pintner Non-Language Group Test, and a series of Performance Tests, to English-speaking and foreign children in Youngstown, Ohio, and conclude from their results that "children who hear a foreign language at home test lower, as a rule, when given the revisions of the Binet test than when given tests which require a minimum knowledge of English," and that "when classified according to mental age, those children who hear a foreign language in their homes may suffer a serious handicap when tested only by revisions of the Binet test." Colvin and Allen (10) used the National Intelligence Test and the Terman Group Test in the case of American-born and Italian children in the public schools of Providence, R. I., and found that the only test in which the Italians were the equal of the native-born Americans was the arithmetic test, in which the language factor plays no important part. After a review of the evidence they conclude that "linguistic ability is an important factor in the score obtained by an individual in an intelligence test that is based largely on words and their uses."

Pintner (62) tested native American, Italian, Polish, and German school children in New York City with the National Intelligence Test, Scale A, Form A, and the Pintner Non-Language Group Test; the Median Mental Age of the total foreign group was equal to that of the Americans in the non-language test, though lower on the N.I.T. Pintner states that "the present data . . . indicate caution in drawing conclusions as to the intelligence of foreign children when tested solely by means of tests which presuppose the understanding or reading of the English language."

Madox (49) gave the Otis Intelligence Test and the Pintner Non-Language Test to English-speaking and foreign children, and found marked superiority for the former in the Otis as contrasted with very slight superiority in the Pintner test.

Walters (77), working with New York City school children, compared the scores made in the non-language tests of the Binet-Simon scale (like the ball and field test, the clock test, etc.) with those presupposing a knowledge of English, and concluded that there was a language handicap of six to eight months mental age in children 13 years old coming from foreign-language-speaking homes.

Mead (51) studied Italian children in Hammondtown, N. J., with the Otis Group Test and found, upon dividing them into four language groups,—those who spoke only Italian at home, those who spoke Italian and some English, those who spoke English and some Italian, and those who spoke only English,—that there was a steadily increasing average score with the amount of English spoken in the home.

Against an investigation like the preceding, the objection has been raised that instead of the poorer scores of the Italian-speaking children being due to the language difficulty, the language difficulty is itself due to failure to learn the language, and therefore to lower intelligence. Such an argument is used by Goodenough (33), who finds a high inverse correlation between the use of a foreign language in the home and Intelligence Quotients (rank order r for nine groups $-.754$). She says "this might be considered evidence that the use of a foreign language in the home is one of the chief factors in producing mental retardation as measured by intelligence tests. A more probable explanation is that those nationality-groups whose average intellectual ability is inferior do not

readily learn the new language." As she herself points out, however, it is necessary to know the length of time any particular nationality-group has lived in America before deciding whether the use of the foreign language in the home shows lack of intelligence. Besides, the inference from the use of the foreign language to low intelligence is very precarious, in view of the differing "cultural patriotism" in the various groups, which may lead one group to prefer to keep the original language, altogether apart from any inability to learn the new one.

Goodenough gave the Goodenough Intelligence Test for Young Children to a large variety of racial and national groups in Tennessee, Louisiana, and California. This test is based upon drawings of the human figure and is entirely independent of language. The results show that the South European and Negro groups rank below the American children and those of North European stock; the rank orders of the various racial groups correspond very closely to the results of other investigators using verbal tests. The inference is that the language factor is of no great importance.

A similar conclusion is given by Bere (5) who gave the Stanford-Binet, National Intelligence Test, and the Pintner Non-Language Group Test to 10-year-old Italian, Hebrew, and Bohemian groups, and who found that there were real differences (the Italians being inferior) even when the language factor had been eliminated. He states, however, that the groups are more closely related on the non-language than on the language tests.

In a recent study Hirsch (40 A) tested Massachusetts children with the Pintner-Cunningham test (non-verbal), the Dearborn A test (largely non-verbal), and the Dearborn C test (half non-verbal and half verbal), and found in spite of the largely non-verbal character of the tests that there were marked differences between American-born children of foreign-born parents. The relative standing of the various groups tested is quite similar to that obtained by the Army testers. Hirsch decides that there is no language handicap in his investigation, his evidence including, *inter alia*, the fact that several of the non-English-speaking groups are mentally much superior to several of the English-speaking groups.

In connection with Oriental groups, Wang (78) demon-

strates the language difficulty by giving students the Ohio State University Intelligence Test, and then pairing Chinese students with native-born white students of the same percentile standing in the same test; he finds the Chinese to be superior in the Number Series test, in which language does not enter, and inferior in a test of General Information, in which knowledge of the language is very important. Murdoch (54) used the N.I.T. and the Army Beta in the case of 12-year-old children of several groups in Honolulu, and found that the Oriental races, especially the Japanese, do much better in non-language than in language tests. Sandiford and Kerr (71) gave the Pintner-Paterson Performance Scale to children in Vancouver, and found Japanese and Chinese children superior to the white norms; they regard the superiority as "undoubtedly due to selection." Porteus (63) gave the Binet-Simon tests and the Porteus Maze (i.e. non-language) tests to various groups in Hawaii, and found that while the Japanese were inferior to the Chinese and the Portuguese in the former, they surpass them both in the latter; the Anglo-Saxons remain slightly ahead in both.

In the case of the American Indian, Fitzgerald and Lude-man (19) analyze the results obtained with the N.I.T., the Terman Group Test, and the Otis Group Test in the case of students at Indian schools in Nebraska and South Dakota. They find that the best result obtained by the Indians in the N.I.T. scale is in the digit-symbol test, "which in a sense is a performance test, not affected by knowledge of language." In the Terman Group Test, the lowest score is in "word-meaning," i.e., a same-opposite test, and in the Otis, the lowest score is in Proverbs. They conclude that "a close study of the tables seems to indicate that the Indians were handicapped to some extent by language, and that they performed better where language was not a vital element in the performance."

It has usually been assumed that there is no language difficulty in the case of the Negro. Certainly there is no obvious one, and the language factor in their case is dependent upon other factors like schooling and education (in the broad sense). Arlitt's results (2) show a gradual decrease in I.Q. with age which she attributes in part to the fact that "Negro children are particularly poor in language tests, of which there are a much larger percentage at the upper end of the

scale than at the lower." Only 33% of the children between the ages of eight and nine passed the eight-year-old vocabulary test.

Sunne (73) gave both a verbal test (N.I.T.) and a non-verbal test (the Myers Mental Measure) to White and Negro children, and found the latter to be just about as much inferior in both, as indicated by the percentage of Negro children who excelled the median of the White children at each age.

In the case of the Negro, the effect of the language factor cannot very easily be demonstrated, but in the case of other groups, including the foreign Whites and the Indians, it seems undoubtedly to be a serious handicap.

3. THE FACTOR OF SCHOOLING

It seems advisable to distinguish two kinds of "education" in connection with the problem of racial differences in intelligence,—one which is dependent upon schooling, or education in the narrower sense, and the other upon what the anthropologists call culture, which includes all the customs and conventions, all the habits of thought and action shared by the members of one community. This latter aspect of "education" has usually been ignored, but the effect of schooling has received considerable attention and has been equated as nearly as possible in many experimental investigations.

One of the best indications of the effect of schooling on standing in intelligence tests is to be found in the results of the Army tests,§ which demonstrated that the men who had more schooling made the higher scores. They showed also that the average score of all Northern Negroes combined is higher than the average score of the Whites of Mississippi, Kentucky, and Arkansas,—a fact which may possibly be accounted for by selection, but which is more probably due, at least in part, to educational differences.

Burt (8) applies the method of partial correlation to the problem of the effect of education on the Binet score, the procedure being to find the correlation between Binet score and school achievement, and between each of these and a measure of intelligence which is supposed to be independent of

§ See Table in Freeman (20), p. 452, for summary of these results.

schooling (Burt's Reasoning Test), and between each of these and age, and then to partial out intelligence and age. With both age and intelligence constant, the partial correlation between school attainments and Binet results is .61. Burt concludes that "with the Binet-Simon scale a child's mental age not only is a measure of the amount of intelligence with which he is congenitally endowed," but "it is also an index, largely if not mainly, of the mass of scholastic information and skill which, in virtue of attendance more or less regularly, by dint of instruction more or less effective, he has progressively accumulated in school." (P. 182.) The difficulty in this procedure is that it is impossible to state whether the reasoning test is really independent of schooling; this must be known before the method of partial correlation can be applied.

Colloton and Rugg (9) and Gray and Marsden (36) find that Binet I.Q. is approximately constant upon retesting, and conclude that education has no important influence.

Wechsler (79) analyzes the data collected by Burt and Terman in order to see what change there is in *variability* with age. His argument is that if education influences the I.Q., the variability should decrease as the subjects grow older, because by that time schooling will have had its effect. He finds no difference up to years 10 and 11; after that, Burt's figures show uniformly reliable decreases in variability, but Terman's do not, except at age 14. Wechsler believes that this discrepancy is due to insufficiencies in the Stanford standardization of the Binet-Simon tests, and consequently prefers the results obtained with Burt's data. He concludes that this study proves the effect of education.

In connection with racial differences, the attempt has frequently been made to equate for years of schooling, the assumption being that this equates for "nurture" in the groups tested, so that whatever differences remain are due to "nature." Most of the investigations indicate that schooling has an effect, but that it does not account for all of the obtained differences; the conclusion is drawn that there are racial differences which do not depend upon education. This conclusion is not warranted unless, and until, the groups are equated for the other non-racial factors which are discussed in subsequent sections.

In a study of Mixed and Full Blood Indians, Garth (25)

finds that within the same grade the former excel by about 11%. He points out, however, that increased education improves the scores for both groups, and further that whereas he has controlled his conditions as far as school training is concerned, there are also differences in social status which may account for the results.

In a study by Hunter and Sommermier (43) which showed a decrease in intelligence score with increase of Indian blood, the factor of total months in school was controlled by the method of partial correlation. There was still a correlation of 0.41 for degree of white blood and total score (Otis Intelligence Test), with the factors of age and months of schooling held constant.

Garth (27) found a close correspondence between the average amount of education of various groups,—Mixed Blood Indians, Mexicans, Plains and Southeastern Indians, Pueblos, Navajos, and Apaches,—and their standing on the National Intelligence Test.

In a later study made in Oklahoma and New Mexico, Garth (30) found an approximate I.Q. of 69 for Indian children, but there was a constant tendency for the I.Q. to increase with education. The correlation between I.Q. and school grade is .25. When compared grade for grade, the white children are about 14% better than the Indian.

More recently, Garth (32) tested Mixed Blood Indians in Oklahoma and South Dakota, and found the median I.Q. to increase as the proportion of Indian blood decreased. When amount of education was held constant, there was a partial r of .42 between N.I.T.-I.Q. and degree of white blood; when degree of blood was held constant, the r between school grade and I.Q. was .18. Garth concludes that schooling has little or no effect on N.I.T.-I.Q.

Ferguson (18), in his study of the American Negro, equated the white and colored children for school grade, but his subjects came from different schools, which introduces an uncontrolled factor into the results. His own opinion is that there is no valid reason to doubt that the schools were comparable. All of them pursued the same general course of study: within a given city all were parts of the same system. This opinion does not quite coincide with the view of many Southern Negroes, who point to the inadequate facilities in

their schools, and the relatively small expenditure for Negro education in most of the Southern states, and who insist that the educational opportunities in the two groups of schools are by no means equal.

Garth and Whatley (31) state that increased education exercises no constant influence on the I.Q. of Negro children tested by the N.I.T., in the schools of Dallas and Fort Worth, Texas. However, the average disparity between chronological and mental age in the case of the Negroes was 2.6 years, while the average difference between white and Negro mental ages for the *same grade* is .87 years. The Negroes are considerably above age for their school grades.

There is some conflict in the results as here reported, but the usual opinion seems to be that differences in schooling have an effect in producing differences between races, but that there are still differences when the factor of schooling has been controlled.

4. THE FACTOR OF CULTURE

In a recent study by Fitzgerald and Ludeman (19) there is an excellent example given of the manner in which general cultural background may introduce difficulties in the interpretation of the results. Exercise 17 of the Logical Selections Test (Test 3) in the N.I.T. scale reads: Crowd (closeness, danger, dust, excitement, number). The examinee underlines two words which tell what the thing always has. In a great number of instances the Indians underlined "danger" and "dust," and frequently "excitement." The authors point out that to these subjects, who have seen crowds gather on a prairie, "crowd" certainly means "dust," and usually "danger" and "excitement" also. There is no difference in intelligence here, but a difference in experience and background.

The Army testers probably thought they had eliminated the difficulties due to education and environment when they substituted the Beta for the Alpha test. The language factor was certainly ruled out, but the "cultural" factor just as certainly remained. The present writer showed Test 6 of Army Beta (the Picture Completion test) to a group of children on the Yakima Indian Reservation and asked them to tell him what was missing. A very large proportion of them failed to see that the net was missing from the tennis court, the

ball from the hand of the bowler, and the filament from the electric bulb; a number of them also had trouble with the stamp missing from the envelope, and the diamond from the playing card. These are all objects which are lacking in their experience; they should certainly not be expected to handle them "intelligently." Professor Boas reports the case of an Italian child who put a crucifix over the house in which the chimney is lacking; this was an intelligent response from the point of view of this child's background and experience, which had taught him that every house must have a crucifix.

In the linguistic tests there are similar "cultural" difficulties of the kind mentioned by Fitzgerald and Ludeman. Army Alpha, Test 3, number 10, asks, "Why should all parents be made to send their children to school?" and suggests as three possible answers (1) because it prepares them for adult life, (2) it keeps them out of mischief, (3) they are too young to work. To an Indian boy on a Reservation, who wishes to stay there, and who regards school as an imposition, the question is absurd, because he thinks parents should emphatically not send their children to school; and the "appropriate" answer is meaningless, because so frequently the school has nothing to do with his adult life. The statement that "a house is better than a tent," (Test 3, number 2), for one of three reasons given, may strike him as very doubtful, and the correct answer to number 16, namely that some men who could afford to own a house live in a rented one because they can make more by investing the money the house would cost, might not occur to him because, being a ward of the U. S. Government, he has no right to invest his money.

To take an example a little farther afield, Test VIII, 3, of the Stanford Revision asks, "What's the thing to do if a playmate hits you without meaning to do it?" The crux of the problem here is that the injury is accidental. Among many "primitive" groups, including several American Indian tribes, no distinction is made between an injury which is done purposely and one which is accidental; this problem would have no meaning, in such a case, and the answer, if it came at all, would most probably be marked wrong.

Instances of tests which do not fit in with the cultural background of the group might be multiplied indefinitely. They demonstrate that even when we have equated for factors of

language and information, the previous "education" (in the widest sense) of the subject may give certain words a significance which the tester did not intend, or may deny relevancy to a situation which the tester had in mind. It is hardly reasonable to take problems which belong in the "native white American" scheme of things, and expect them to be applicable to a different group brought up in a different culture.

An attempt to start at the other end, and apply to white children tests which arose out of another environment, was made by Velma Helmer (39) who devised tests which contained subject matter relating closely to the life of various Indian tribes represented at Haskell Institute. The tests were modelled on the "Best Answer" type, and other standard types, so that they cannot be said really to be alien to the white child in that sense, but they contained references to "tepee" and "hogun," to Indian foodstuffs, religious ceremonies, social customs, etc., which were more familiar to Indian than to white children. On many of these tests, the white children were definitely inferior. This is obviously an unfair test of American White intelligence, but not more so than many other tests are of Negro or Indian or Italian intelligence.

A study which indirectly illustrates the effect of "education" in the wider sense was made by Arthur (3) at Chisholm, Minn., using the Kuhlmann-Binet Scale. She tested 92 pairs of siblings,—Finnish, Russian, and South European,—and found an average I.Q. of the elder siblings of 93.05, and of the younger 99.14; a difference of 6.8 points. She ruled out the language factor by testing another group of 151 pairs of siblings, the elder of which had had one or two more years of English training than the younger; the difference held. She concludes: "For the community investigated, the elder siblings of immigrant families are, on the average, inferior to the American population in general intelligence, but the younger children are, on the average, good intellectual stuff." (P. 549.) It is hardly necessary, however, to postulate differences in intelligence to account for the results; the author herself points the way to a more satisfactory explanation. She says: "Certain immigrant families fail to show any tendency to vary in I.Q. according to position in family. These appear to be largely of two types: First, those who have

adopted American customs and habits of living in a high degree, i.e., whose habits of living seem to have become stabilized at the American level; and second, those whose habits of living have been influenced, relatively, very little by the new environment, i.e., who are still stabilized at the earlier level . . . while families going through a transition stage from their old world habits of living to new world standards tend towards an increasing I.Q. for successive offspring that works to the advantage of the younger children." This is an excellent illustration of the effect of culture on intelligence test results, though the author does not give it as such. What probably happens is that in the families at the transition stage, elder siblings have remained closer to the "old world level of living," and the younger have been brought up in "the American level of living." If the family stays at the old level, the younger child does as poorly as the elder. If the family has adopted the new level, the elder does as well as the younger. Differences in "intelligence" are much less probable here than differences in adaptation to the new culture.

Feingold (17) obtains a somewhat analogous result with a modified Army Alpha, given to students in the public high school at Hartford. The results show that the mental difference between the American born and the lowest-ranking white foreign races (Polish and Italian) is only nine months, whereas the mental difference between native-white and foreign-born draftees in the Army was about 2 years. He suggests that "if the first generation of East European immigrants can more than half bridge the mental gap that exists between their parents and native Americans, is it not more than probable that most of the original gap was due to environment, i.e., differences in educational opportunity, rather than heredity?"

5. THE FACTOR OF SOCIAL AND ECONOMIC STATUS

The influence of social and economic status upon mental ability as measured by tests has been the subject of a great many investigations, altogether apart from the problem of racial differences. Among the earlier studies, Decroly and Degand (13) tested 45 children in a private school in Brussels and found that none of them tested below age, nine tested

at age, and the rest were one to three years above. Similar results were obtained by Morlé (53) who compared schools in good and poor sections of Paris. Hoffman (41) in Breslau, Germany, and in this country Yerkes and Anderson (84) at Cambridge, Mass., found marked differences of a similar character.

A study with Binet-Simon tests made in New York City by J. and R. Weintrob (80) included subjects from Horace Mann School, Speyer School, and the Hebrew Sheltering Orphan Asylum. The authors state that if environment were the determining factor, the tests should have placed Horace Mann at the head, with an appreciable interval dividing it from Speyer in second place, and the Asylum at the foot. Instead, there were small and inconstant differences between the three, but Speyer was invariably last, and Horace Mann and the Asylum were always close together, the Asylum in many instances being ahead. The authors are inclined, therefore, to regard the environment as relatively unimportant. However, the difference between the groups in racial, or preferably "cultural" constitution introduces a complicating factor which throws doubt on the significance of the results.

Bridges and Coler (7) tested the children in two schools in Columbus, Ohio, and compared the results with those obtained at Cambridge. They conclude that "there is a very considerable dependence of intelligence on sociological condition."

Pressey and Thomas (65) compared country school children in a poor rural district in Indiana with others in a fairly good district. The country children as a whole rate about one and one-half years in mental age below city children, and the children in the good farming district average above the children in the poor district. Twenty per cent of the poor group, and 36% of the good group, exceed the city medians. In another study Pressey (64) reports similar results, and concludes that the "differences previously found were differences in innate ability, not in schooling or home culture." The fact that similar results were obtained on two separate occasions is hardly adequate proof that they depend upon innate differences.

Book (6) studied high school seniors in rural and urban schools, and found similar, though not as marked differences.

Freeman (20) suggests that "the lesser difference may indicate that at least part of the superiority of city children may be due to superior training, since it becomes less as the amount of training increases."

There are a great many studies indicating that mental capacity, as measured by the tests, is closely related to occupation. The Army results (52) which have been frequently quoted, showed very wide variations, the median score of some occupational groups (for example, accountants, civil engineers, stenographers) being more than twice that of others (for example, farmers).

Pressey and Ralston (66) gave the Pressey Group Scale to children in an Indiana city, and found a close correspondence between test scores and the occupation of the fathers, the professional class being at one extreme and the laborers at the other, with executives and artisans in between. In another study Pressy (64) found that children of professional and business men rate distinctly above children of laboring men and mechanics. Haggerty and Nash (38) report similar results with the use of the Haggerty Intelligence Examination on a large group of New York school children, the professional group being at one extreme and the farmers at the other, although the children of unskilled laborers ranked higher than those in the skilled and semi-skilled groups. Dashiell and Glenn (12) in North Carolina, MacDonald (47) and Duff and Thomson (16) in the British Isles, and Kirahara (46) in Japan also report a close correspondence between intelligence of children and paternal occupation, the "brain" workers ranking considerably higher than the "hand" workers in each case. Terman (74) found that the proportion of gifted children was greatest in the professional group, next in the public service group, third in the commercial group, and lowest in the industrial group. Phillips (59) similarly reports that "of the 41 children found in California having a superior I.Q., all save one belonged to families of culture and intelligence, of which one or both parents were college graduates." He concludes that "association in environments, not native intelligence, qualified them to answer."

Commenting upon results of this type, Freeman (20) suggests that part of the explanation may be that the manner of life of certain of the groups which stand low in the tests in-

volves fewer activities which are similar to those which are required in taking intelligence tests than does the manner of life of those who stand high. "Compare, for example, the farmer and the railroad clerk. It is obvious that the clerk is required by his occupation to do things that are more like the things which are done in taking an intelligence test than is the farmer." (p. 472.)

The implications for the problem of racial differences are very important because of the fact that so many of the groups tested are inferior in social and economic status to the native-born Whites with whom they are compared. Several studies have included an attempt to equate the groups for this factor, or at least to take it into account in the interpretation of the results. For example, Mayo (50) tried to equate his Negro and white groups for social standing before making a comparison of their academic achievement. Phillips (58) visited the homes of the Negro and White children whom he tested, and equated the environmental factor by pairing each colored boy with a white boy of approximately the same age and home conditions. In both of these studies there was still a definite superiority on the part of the Whites. Pyle (67) tested Negroes in the public schools of Columbia, Mexico, and Moberley, Missouri, and found when he divided them into poor and good social groups, that the good group stood about midway between the poor group and the Whites. Derrick (14) tested white students at the University of Southern Carolina, and colored students at Benedict College and Allen University, Columbia, S. C., and found that the white scores were somewhat higher; he points out, however, that the academic standing of the Negro colleges was very much inferior, and also that there was a high degree of correspondence between social and economic environment and I.Q.

Arlitt (1) points out the need for caution in establishing race norms, as the result of her findings with the Stanford-Binet applied to native White, Negro, and Italian groups. There are differences in median I.Q. between the three groups which favor the native Whites, but within the White group there is a difference of 32.9 points between those subjects with "very superior" and those with "very inferior" social status. This difference is much greater than the difference between the races. The "inferior" and "very inferior" White

group is still slightly above the Negro and the Italian, however, and this remaining difference is assumed to be due to race. The general conclusion is that there is more likeness between children of the same social status but different race than between children of the same race but of different social status.

Wells (81), in a study made at Oberlin, found a certain amount of superiority of White over Negro children in intelligence tests, but does not regard this as evidence of inherent superiority. He explains his findings by (1) the limitation of possible professions for Negroes, and the consequent smaller incentive to continue with school work, and (2) their bad economic situation. The per capita wealth of the Whites is more than five times that of the Negroes.

In the article by Hunter and Sommermier (43) quoted above, the problem of social status is considered, and reference is made to the impossibility of securing adequate data. The statement is made that "the Indian's social environment is probably inferior to that of White children. Within the Indian group, it is possible that social status rank decreases with increase of Indian blood. It is to be remembered also that inferior social status may very well be the result of low intelligence rather than its partial cause." However, if the social status of the groups with more Indian blood was inferior, it is certainly possible, if not probable, that that fact was in part at least responsible for Hunter's findings.

Garth (24) finds that while the Mixed Bloods do better than the Full Bloods on his test, they also have a better social and educational status; however, he "doubts if an equality of school attainment would remove the indicated differences." Elsewhere (25) he states that the results obtained by several Indian groups on the N.I.T. follow exactly the same sequence as the estimates of their social status. Referring to the results of another study (30) he says that "because of differences in social status and temperament we cannot conclude that our results are true and final measures of the intelligence of Indian children." Paschal and Sullivan (55) found that the Tucson Mexicans, who are partially of Indian origin, have a lower mental score on performance tests than those who are wholly of White origin, but their social status and their school standing is also lower.

Fukuda (21), working at Evanston, Ill., with the Terman Revision of the Binet, found a lower I.Q. for the non-English-speaking than for the English-speaking group, which he regards as mainly due to differences in occupation and environment. There is a difference of four points I.Q. between the two racial groups, and of 13 points between the children of men engaged in business and office work, and those of unskilled laborers. The English-speaking group engages more in "brain and skilled work" than the non-English-speaking.

Graham (34) finds a close correspondence between the living conditions and financial status, and the Stanford-Binet scores, of the three groups tested (Italians, Jews, and native Americans).

Goodenough (33), commenting on findings of this type, regards it as "probable, on the whole, that inferior environment is an effect at least as much as it is a cause of inferior ability, as the latter is indicated by intelligence tests. The person of low intelligence tends to gravitate to those neighborhoods where the economic requirement is minimal; and, once there, he reacts towards his surroundings along the line of least resistance. His children inherit his mental characteristics."

Hirsch (29) is of the same opinion. Commenting on his finding that there are grades of intelligence among the children of parents of various occupational callings, he states that "it seems very highly probable that intelligence is a causative factor in the selection and pursuit of occupational calling; intelligence is related to occupation as cause is to effect" (p. 328).

It is impossible at this stage definitely to settle the problem of which came first,—intelligence, or social and economic status. Perhaps there is a reciprocal influence. In the case of certain racial groups, however, it can hardly be denied that to a very great extent their economic status is thrust upon them. To the Southern Negro, most occupations are closed; unless he is a very exceptional individual, he will become a day laborer, a domestic servant, a worker on the plantations, a barber. The exception may become a dentist, a doctor or a lawyer. Even then, there is no justification for "equating" a Negro and a White doctor or lawyer, and assuming that their social and economic status is identical. The gap between the two is enormous, and it can never be bridged by the Negro.

He must work among his own people; he must get along without a great many of the social and educational opportunities which the Whites enjoy; living usually in a comparatively uneducated community, he must create his own cultural and intellectual life, or do without. In the large Negro centers in Harlem and Brooklyn, Washington and Philadelphia, the situation is, of course, very different, but even there it is impossible to say that a Negro has the same social and economic status as a White man in the same profession. He is under a handicap which no amount of "intelligence" can quite overcome.

To a lesser extent, the same is true of certain European groups. The Italian coming to this country finds that other Italians do certain kinds of work, usually unskilled labor, and he naturally follows the social pattern of his group. The Jew coming to this country finds that other Jews have become merchants, so he buys and sells on a small scale, and opens up a shop as soon as he can; later, owing perhaps to his intelligence, but more probably to the socially determined values of his group, he sends his son to college or to the professional schools. The Italian and the Jew may differ in intelligence, but they certainly differ in social patterns, and these patterns will help to determine the "social and economic status" which later shows its effects on the results of the intelligence tests.

6. THE FACTOR OF RAPPORT

This factor is less obvious in its effect than most of the others so far considered, but it may exert an important influence. It is the factor of strangeness, of fear, of suspicion, which may enter into the relations between a native-white tester and a Negro or Indian or foreign child who does not know what it is all about. Garth (26) writes, "Another important phase of the experiment is the technique of its administration, which would include placing the subject at his ease. It is just possible that White children have an advantage over Indians and Negroes in this respect with a White experimenter administering the psychological test, whether it be an individual or a group test. Some conditions cannot be perfectly controlled. This loophole, however, should be most carefully guarded."

Gregg (37), referring to the Army results, points out that "when you have a white officer examining a black private there is a variable factor of fear, hesitation and unreported misunderstanding for which some allowance should be made, and for which, so far as I know, no allowance has ever been made."

As Garth says, some conditions cannot be perfectly controlled, and this is undoubtedly one of them. The Indian is notoriously suspicious of the White man, not without reason; often he will refuse to talk to him, or give him any information whatever. The Negro, at least in the large cities, has often heard something about intelligence tests, and, knowing what results they have shown, objects inwardly, if not outwardly, to taking them; in the smaller communities, he has probably heard nothing about the tests, but the unfamiliar presence of a white tester at school or at home, neither of which he otherwise visits, may be extremely disturbing. With the foreign groups, this factor would not be as important, as there have been contacts, with teachers and others, which make the test situation more familiar.

There have probably been many investigations in which the rapport must have been all that could be desired, but it is impossible to say which these were. The personality of the tester, and the reactions of the subjects to it, are too elusive to be measured exactly; but the possibility of their influence must be borne in mind.

7. THE FACTOR OF MOTIVATION

This is still less obvious, and still more elusive, than the last. It is concerned with whether the subjects are doing their best throughout the intelligence examination. The tests presuppose "that each person is interested in doing as well as he can; that because of individual competition he will be spurred to maximum effort."|| Often this supposition is entirely unwarranted. People who have been educated in modern schools know what it is to compete in tests and to put their best into them, but it does not follow that other groups will also be similarly motivated, and to the same extent. It is sometimes extremely difficult to know just how hard the

|| Peterson, Lanier, and Walker (57).

subject is trying, particularly in group tests, in which the reactions of a particular individual may pass unnoticed.

In a study by Baldwin (4) of White and Negro delinquent girls by means of a substitution test, it was noted that the Negro girls were slower to warm up, and first to drop back and lose interest. They were more difficult to enthuse, and could not be forced or easily stimulated, except temporarily through flattery. "They are suspicious as to the value of the task." Certainly such an attitude is hardly conducive to one's maximum performance and must be considered in any interpretation of the results.

8. THE FACTOR OF SAMPLING

The various factors so far discussed make it possible to understand how differences may arise in the results obtained by various groups in tests of intelligence, even when there are no real differences in intelligence. There is the further possibility that owing to the factor of selection, or inadequate sampling, there may be real differences between the intelligence of the groups actually tested without there being corresponding differences between the intelligence of the races or nations which these groups represent. Even when all the care in the world is exercised in the choice of the sample, there may still be conditions present over which the investigator has no control and which inevitably make the sample unrepresentative. This possibility arises whenever an inference is drawn from the mentality of an immigrant group to the mentality of the nation or race from which these immigrants come. For example, Chinese children in America almost invariably make a better showing than Italian children in tests of intelligence, although apparently subject to exactly the same handicaps arising out of the factors of language, education, culture, rapport, etc. This may point to a difference in the intelligence of Chinese and Italian children in America, but the inference to a difference between Chinese and Italians in general is impossible until more is known about the extent to which these two immigrant groups are representative samples. There may be a much more rigorous selection operative in the case of the Chinese, as has often been suggested. What is needed here is in the first place a study of the conditions of immigration

of the various groups tested, and in the second place a direct comparison of the immigrant groups with as large as possible a random sampling of the original groups and in the original habitat, in this case China and Italy. This may not seem to affect the practical problem of the character of our immigrant groups, but it does affect considerably the more theoretical, but for our purposes more important problem of the character of the races concerned.

9. THE FACTOR OF SPEED

This factor is considered throughout the present investigation, and need not be discussed in detail at this point. It may perhaps suffice to point out that, unlike the other factors reviewed, there is a possibility that differences in speed may be racial. The results of this study, however, give evidence to the contrary, and suggest that speed also should be included among the non-racial factors which have given experimental support to the theory of racial differences.

Finally it may be pointed out, that while *no one* of the above factors is capable of explaining all the observed differences, the whole group taken together may very well do so. If this should be admitted, intelligence tests as applied to groups would lose none of their importance, but their interpretation would alter considerably. They would then be significant as discovering and defining differences between *groups* rather than *races*,—differences which are a function of a complex of factors which are environmental, and not hereditary, but which are no less important for that reason.

10. THE PRESENT INVESTIGATION

Performance tests in the Pintner-Paterson series (60) were given to Indian groups on the Yakima Reservation, Washington, and at Haskell Institute, Lawrence, Kansas; to Negro groups in New York City and in a rural district in West Virginia; and to White groups in New York City, West Virginia, and Toppenish, Washington. These tests were chosen because of their freedom from the language difficulty and their relative freedom from the influence of education and culture;

this freedom is only relative, because manual skill, familiarity with some of the situations (as in the Healy Picture Completion test) and the habit of playing with puzzles and building blocks may affect the results considerably. Because of the lack of suitable norms at the upper ages, as well as of adequate standardization of the procedure of recording errors and moves, comparison with the Pintner-Paterson norms is in many cases a questionable procedure, and it has been reduced to a minimum in the present study.

It is interesting in this connection to note the suggestion of Johnson and Schriefer (44) to the effect that measures of "errors" and "moves" be omitted from the Performance Scale, one of their reasons being the difficulty of recording them. It is certainly difficult to standardize the procedure so as to make results obtained by different investigators comparable. There must be an "error of observation," or at least a "personal equation" of observation which can only be disregarded when the same observer is responsible for all the data used in the comparison.

For the various reasons discussed in preceding sections, the direct comparison of one racial group with another in the attempt to determine racial differences seems to the present writer to be always open to question. There are too many uncontrolled and uncontrollable factors which enter into the result. Whenever such direct comparisons are made in the course of this report, they are to be regarded as subject to the same strictures which the writer has applied to a similar procedure in the case of other investigations; they are usually included in order to bring the results into relation with those obtained by others. The method which has been stressed in the present study is rather the comparison of groups within the same race but living in widely differing environmental settings, in order to see the effect of the latter on what seem to be racial characteristics. It will be seen that the term "environment" is used in its widest meaning, and includes all that is not biological or racial or hereditary.

II. THE YAKIMA INDIANS

1. THE SUBJECTS AND THE TESTS

This portion of the investigation was conducted during July and August, 1926, on and near the Yakima Indian Reservation, Washington, about 300 miles east of Seattle. Performance tests were given to 148 Indian children, of whom 28 were less than three-fourths Indian, leaving a group of 120 to be used in most of the comparisons; and to 107 white children living in the town of Toppenish, in the heart of the Reservation, and known as the Reservation City. The ages of both groups ranged from 7 to 16 years. The Indian homes were scattered over an area of about 25 miles radius, with Toppenish as its center. The children were selected absolutely at random; every house on the Reservation in which there were any children was visited, and practically every child who could be found was tested.¹ The White children were also chosen at random by visiting from house to house in Toppenish. For the most part they went to the same schools as many of the Indian children; they were the sons and daughters of merchants, artisans, professional men, etc., and probably represented a very fair cross-section of the whole population.²

The tests used were six tests in the Pintner-Paterson series,—the Mare and Foal test, the Casuist Form Board, the Triangle test, the Healy Puzzle "A," the Ship test, and the Knox Cube test. In the first three of these, a record was kept of the time and the number of errors; in the Healy "A" test, the number of moves, rather than errors, was recorded. The Ship test and the Cube test were scored according to the directions in the Pintner-Paterson manual (p. 61 and p. 69), the former on a basis of 20 points for the correct solution, and the latter by the number of lines repeated correctly.

¹ Most of the subjects were obtained through the kind cooperation of Mr. Estep, the Government Agent on the Yakima Reservation, and Miss Esther Sprague and Miss Bertha Lemley, Field Matrons in the Indian Service, who introduced the investigator into the Indian homes, establishing friendly contacts for him, and aiding him in securing whatever information was required.

² The writer acknowledges with thanks the aid given him by Mr. G. R. Fields, Superintendent of Schools in Toppenish, and Mrs. Dahlman, one of the members of his staff, in securing subjects.

2. THE RESULTS

The detailed results for the four Form Boards follow:

MARE AND FOAL TEST

<i>Indians</i>				<i>Whites</i>		
<i>Age</i>	<i>N</i>	<i>Median Time</i>	<i>Median Errors</i>	<i>N</i>	<i>Median Time</i>	<i>Median Errors</i>
7	7	57	1	11	47	3
8	10	60	2	7	35	3
9	15	37	1	11	34	2
10	16	39	1	14	31	2
11	15	32	1	16	31	2
12	9	29	1	14	23	1
13	23	31	1	14	26	2
14	9	23	0	9	30	2
15	8	23	1	6	25	1
16	8	24	1	5	20	0
120 Av. 37.5 Av. 1 Med. 31.5 Med. 1				107 Av. 30.2 Av. 1.8 Med. 30.5 Med. 2		

At eight ages out of ten, the White medians for *time* are lower than the Indian; at two ages (12 and 14) the Indian medians are lower. At seven ages out of ten, the Indian medians for *errors* are lower than the White; at one age (16) the White median is lower; at two ages (12 and 15) the medians are equal.

Range,—White, 14—149 seconds, 0—14 errors.

—Indian, 17—136 seconds, 0—8 errors.

(N.B. The measure of central tendency used throughout this report is the median, which takes account of all cases in which the test was not solved within the time limit of five minutes, as well as of the successful cases. In calculating the median number of errors or moves, the D N C cases (i.e., those who did not complete the test within the time limit) were regarded as having made a greater number of moves or errors than the poorest of the successful cases; all of the D N C cases thus are placed at the lower end of the distribution. A subject who failed to complete the Healy A test, for example, in five minutes, and made only twenty moves in the attempt, would be regarded as having made a greater number of moves than the subject who made one hundred, but solved the test successfully within the time limit.)

CASUIST FORM BOARD

<i>Indians</i>				<i>Whites</i>			
<i>Age</i>	<i>N</i>	<i>Median Time</i>	<i>Median Errors</i>	<i>N</i>	<i>Median Time</i>	<i>Median Errors</i>	
7	7	129	8	10	86	8	
8	9	158	8	7	151	12	
9	15	95	3	11	121	13	
10	16	97	4	14	69	7	
11	15	79	4	16	87	7	
12	9	78	3	14	64	4	
13	23	77	3	14	58	5	
14	9	58	4	9	50	3	
15	8	47	3	6	38	3	
16	8	42	2	5	49	3	
119		Av. 86.0	Av. 4.2	106		Av. 68.7	Av. 5.7
		Med. 79	Med. 4			Med. 67	Med. 6

At seven ages out of ten, the White medians for *time* are lower; at three ages (9, 11 and 16) the Indian medians are lower. At seven ages out of ten, the Indian medians for *errors* are lower; at one age (14) the White median is lower, and at two ages (8 and 15) they are equal.

Range,—Indian, 27 seconds—D N C, 0—31 errors.
 —White, 22 seconds—D N C, 0—47 errors.

THE TRIANGLE TEST

Age	Indians			Whites		
	N	Median Time	Median Errors	N	Median Time	Median Errors
7	6	92	11	10	92	20
8	8	90	13	7	76	13
9	14	88	13	11	59	11
10	16	107	14	14	46	11
11	14	79	10	16	75	17
12	9	53	8	14	39	9
13	21	77	10	13	43	10
14	7	47	6	9	63	11
15	8	30	4	6	42	11
16	7	31	4	5	20	6
	110	Av. 69.4	Av. 9.3	105	Av. 57.0	Av. 11.9
		Med. 78	Med. 10		Med. 53	Med. 11

At seven ages out of ten, the White medians for *time* are lower than the Indian; at two ages (14 and 15) the Indian medians are lower; at one age (7) they are equal. At six ages out of 10, the Indian medians for *errors* are lower; at two ages (9 and 10) the White medians are lower; at two ages (8 and 13) they are equal.

Range,—Indians, 10 seconds—D N C, 0—43 errors

—Whites, 10 seconds—D N C, 0—57 errors

HEALY PUZZLE "A"

Age	Indians			Whites		
	N	Median Time	Median Moves	N	Median Time	Median Moves
7	6	203	43	11	204	50
8	8	276	40	7	215	49
9	14	175	32	11	147	43
10	16	108	18	14	114	29
11	15	95	18	16	65	20
12	9	73	15	14	71	23
13	23	60	13	13	43	18
14	8	63	14	9	49	15
15	8	77	16	6	48	20
16	8	39	11	5	18	9
	115	Av. 116.9	Av. 22.0	106	Av. 97.4	Av. 27.6
		Med. 86	Med. 17		Med. 68	Med. 21.5

At eight ages out of ten, the White medians for *time* are lower than the Indian; at two ages (7 and 10) the Indian medians are lower. At nine ages out of ten, the Indian medians for *moves* are lower than the White; at only one age (16) is the White median lower.

Range,—Indians, 10 seconds—D N C, 5—52 moves

—Whites, 11 seconds—D N C, 6—86 moves

It is apparent that in the case of these four tests there is a difference in the behavior of the two groups, but a difference which cannot be expressed in terms of the superiority of one group over the other. It is a qualitative rather than a quantitative difference,—a qualitative difference which can, however, be expressed in quantitative terms. Clearly the White children completed the tests more quickly, while the Indian children made fewer errors.

In extreme cases, the difference is very striking. Here are two actual cases, one white boy, one Indian; both are 10 years old. The Casuist Form Board is put before them, and they are asked to put the pieces in their right places as quickly as possible. The white boy jumps at the puzzle; he tries the piece here, there, everywhere; when he strikes what seems to be its proper place, he leaves it there, and flies to the next. He completes the test in 66 seconds, but he has made 14 errors in the process. The Indian boy moves slowly, deliberately; he seems to think each move twice over. He has also been told to work "as quickly as possible," but that obviously means little to him. He sees no need for hurry. He takes 137 seconds to complete the test,—a poor performance, apparently, but he has not made a single false move. One Indian boy of 13 solved the Casuist Form Board in 170 seconds without a single error, and many others approached this general type of performance.

An indication of the amount of difference can be obtained by a comparison of the two groups as a whole, disregarding ages. Such a comparison is legitimate, as the age range of both groups is the same (7 to 16 years), the median age for both groups is 11 years, and the Standard Deviations almost identical,—2.56 years in the case of the Indians, and 2.51 in the case of the Whites.

Compared in this way, the median records obtained by the two groups are as follows:

Mare and Fowl Test

Indians	33 seconds (8.5), ³	1 error (.5)
Whites	29 seconds (7.5),	2 errors (1)

³ Figures in parenthesis refer in each case to the Q of the distribution.

Casulist Form Board

Indians	79 seconds (31.5), 3 errors (2.5)
Whites	71 seconds (34.5), 5 errors (4.5)

Triangle Test

Indians	67.5 seconds (40), 10 errors (6.8)
Whites	48 seconds (36.5), 11.5 errors (7.5)

Healy Puzzle "A"

Indians	95 seconds (97.5), 17 moves (13.5)
Whites	85 seconds (88.5), 25 moves (20.5)

Reliability formulae were not applicable to these differences, owing to the rather steep descent of the curve with age, and the consequent large Probable Errors. (Because of this age factor, a comparison of the two groups in terms of per cent of overlapping would also be misleading.) The consistency of the results for all four tests, and at practically every age level, would seem to be a fairly satisfactory index of their reliability, even if the usual statistical proofs are not available.

3. THE INDEX OF SPEED

An indication of the actual speed of movement of any subject can be obtained by dividing the number of seconds used in completing a test by the number of moves made. Thus if a subject completes the Healy puzzle in 60 seconds and 20 moves, he must make on the average one move in 3 seconds, and we may speak of his I.S. or Index of Speed, as being equal to 3.0. (It is to be noted that the higher the Index, the slower the rate of movement; it might be preferable to speak of an Index of Slowness, except that this expression is somewhat clumsy.) The Speed Indices of every subject were calculated for two tests,—for the Healy Puzzle "A" in the manner described, and for the Mare and Foal test by adding 7 to the number of errors recorded, and then dividing this new number into the total number of seconds. This is exactly the same as counting moves, as seven correct moves are needed for the completion of the test; and as no correct move is ever repeated. In the case of the other tests (Casulist and Triangle), this procedure could not be followed, because so frequently a

block which had been put in its correct place was removed and then replaced, so that more moves were made than would be represented by the minimum number plus the number of errors. With the Mare and Foal test there was no such difficulty. Two Speed Indices were thus calculated for each subject, in order to obtain some indication of the reliability of any observed difference by seeing whether it held for more than one test.

The following table gives median Speed Indices at each age, for white and Indian children, based on results in the Mare and Foal test, and Healy "A":

Age	Median I. S. Mare		Median I. S. Healy	
	Indian	White	Indian	White
7	6.7	4.3	4.5	4.0
8	6.5	3.8	5.5	3.8
9	4.5	3.6	4.5	3.5
10	5.0	3.4	5.0	3.3
11	4.4	3.5	4.3	3.0
12	3.2	2.9	4.3	3.1
13	3.8	3.0	4.5	3.2
14	2.9	3.3	4.5	3.2
15	3.0	2.9	4.8	2.6
16	3.6	2.9	4.0	2.6
	Av. 4.36	Av. 3.36	Av. 4.59	Av. 3.29
	Med. 4.1	Med. 3.35	Med. 4.5	Med. 3.15

It is to be noted that only one of the White medians is higher than the corresponding Indian median (age 14, Mare); the other nineteen comparisons show higher Indices, therefore, slower speed, for the Indians.

Medians for the whole group, again disregarding ages, are:

Mare: Whites 3.5 (.55)⁴
 Indians 4.1 (1.25)

Healy: Whites 3.15 (.65)
 Indians 4.5 (1.35)

Thirty-one per cent of the Indians make one move in the Mare and Foal test as quickly as, or more quickly than the

⁴ Figures in parentheses again refer to the Q of the distribution.

median white child, while only 15% of the Indians move as quickly as the median white child in the Healy "A" test.

The $\frac{D}{PE \text{ (diff)}}$ is equal to 7.1 in the case of the Healy "A" test, which means that the difference in Speed Indices is about 77% greater than it need be in order to be a true difference; in the case of the Mare and Foal, the $\frac{D}{PE \text{ (diff)}}$ equals 3.5, and the chances are 99 in 100 that there is a true difference. Actually, the reliability is even greater, for in this case also, as can be seen by the figures on page 9, there is an appreciable, though not a regular, decrease in the Speed Index with age, which raises the Q of the distribution unduly. If we use only the records of those subjects who are twelve years old or more (i.e., beyond the point where age makes a difference in speed), the results are:

Mare: Whites, 2.9 (.55), N = 50

Indians, 3.6 (.6), N = 75

Healy: Whites, 2.8 (.7), N = 46

Indians, 4.3 (1.5), N = 71

$\frac{D}{PE \text{ (diff)}}$ in the case of the Mare test is 5.4, and in the case of Healy "A," 5.9; that is to say, there is a statistically reliable difference in both cases.

4. SPEED AND THE INDIAN

Obviously no generalization can be made for all American Indians, or even for all Reservation Indians, on the basis of results obtained on one Reservation, but it is interesting to note that the Indian's almost complete lack of concern for speed has struck most observers who have had any considerable contact with him. The Government Agent on the Yakima Reservation, the Superintendent of Schools at Toppenish, anthropologists who have worked intimately with Indians, and several Indians themselves, agreed that the results were quite what they would have expected. The emphasis on speed, which is one of the striking characteristics of modern American life, has apparently not penetrated within the cultural pattern of the Indian, at least on the Yakima Reservation. The testi-

mony of careful observers suggests that the same holds true for many other Indian communities as well. The whole tempo of life is different.

Those who look for economic interpretations of social and psychological phenomena will have little trouble in this case. Speed seems to have a place in a competitive society, but there is no economic competition among the Yakima Indians. Not more than 15% of the able-bodied men "earn their living," from the White man's standpoint, by farming and herding. Most of the others live on the rent which white people pay for the use of their land; only the most enterprising of them will struggle against the dry climate and poor irrigation which make farming so difficult. Fishing and berry-picking supply them with the greater part of the food which they require. For the rest, they do as they wish,—but slowly. They have no need for speed.

It is in such a slow-moving, easy-going community, that the Indian child grows up. Nobody hurries. If the family starts out in the car for a hundred-and-fifty-mile trip, nobody cares much about getting there at any particular time; there is no particular advantage in making the trip in one day instead of two. If the family is away picking hops in the early fall, the children will come back to school a month late; what difference does a month make, anyway? The somewhat desultory attendance at school has comparatively little effect on this general habit of mind and action, which shows itself even in performance tests which have to be done "as quickly as possible." Contrast this whole mode of life with the hustle and bustle of any American town of a few thousand inhabitants, and the speed difference in the tests is easily understood.

5. RACIAL DIFFERENCES IN METABOLISM

The possibility remains that the slowness of the Indian is due to racial, perhaps to metabolic factors. Thus MacLeod, Crofts and Benedict⁵ report that the basal metabolism of 9 normal Oriental women, 7 Chinese and 2 Japanese, was in most cases strikingly low, on the average being 10.4% below the prediction standard. These women were "of an age

⁵ See Reference (48).

ranging between 21 and 29 years, transplanted to an American climate and food conditions, and surrounded by the nervous tension incidental to the rush of Western civilization." The vital capacity was also very low, and the average pulse rate (60, min. 54, max. 64), was "at the lower, if not below the lower, limits for normal American women." The authors are of the conviction that there is a specifically low cell metabolism characteristic of the Orientals. They cite also the researches of previous investigators, which point in general to a similar conclusion, although usually conditions of climate and diet were not satisfactorily controlled. More important for our purposes, is the statement of H. G. Earle⁶ (quoted by the authors) to the effect that "the normal metabolic pace is set at a lower level than that of Western subjects and the question arises how far this can be correlated with other differences between the Eastern and Western peoples." Earle asks three questions which are very pertinent to our topic. "Has the rush of Western civilization produced a higher metabolic rate? Is the low metabolic rate of the Chinese a physiological expression of their more philosophical outlook on life? How far do climatic conditions, apart from race, affect the metabolic rate?"

Body metabolism is a most complex process, in which the absolute and relative importance of climate, diet, and other "external" factors has still to be definitely determined. For example, the effect of climate is still unsettled,⁷ though there is evidence that "white men going to the tropics exhibit a gradual decrease in heat production," and that "there may be a rather large decrease in the inhabitants of some tropic countries." The influence of diet is also debatable; the evidence is conflicting. Athletic training appears to raise the basal metabolism 2.5%. Occupation probably has an effect, according to some investigators.⁸ Even the investigation here cited, which has apparently controlled these factors, offers no proof that the early environment, dietetic and otherwise, of these Oriental women students is not responsible, at least in part, for the results.

Earle's speculation as to the relation of "the rush of West-

⁶ Reference (48).

⁷ DuBois. See Reference (15).

⁸ Takahira. See Reference (15).

ern civilization" to the higher metabolic rate, and of "the more philosophical outlook of the Chinese" to their lower metabolic rate, is particularly interesting in view of the close racial affinity of the American Indians with the Chinese, as well as their somewhat similar avoidance of the "rush" by which Western civilization is characterized. It is interesting, however, that Earle leaves open the question as to which came first, the "rush," or the higher metabolic rate. The latter may very well be an effect, rather than a cause, and we may still have to look to the cultural patterns of the Indians, rather than to the slower tempo of their metabolic processes, to explain the difference in speed. With the exact influence of diet and other factors still undertermined, the correlation of an activity or an attitude with metabolism need not necessarily mean that such an activity or attitude is racial, hereditary, and carried in the germ plasm.

One way of investigating the possibility that racial, and not cultural, factors are responsible for the difference in speed, would be to test Indians who lived in a social environment very similar to that of the Whites, and see whether the more hectic life of large American cities, or a large "white" school, tends to speed up their activities. Such an American Indian group is not easy to find, but the students at Haskell Institute, at Lawrence, Kansas, are approximately in this situation, and the results obtained there are interesting in this connection. They are reported in detail later (see p. 72), but it is perhaps appropriate to mention here that their evidence is in favor of an environmental, and not a racial origin of the observed difference.

6. SPEED INDICES OF MIXED BLOODS

If the deficiency in the speed factor is an Indian racial characteristic, it seems reasonable to assume that it should be less marked as the degree of Indian blood decreases. The Mixed Bloods on the Reservation are "Mixed Bloods" also in culture, but they are for the most part socially and culturally Indian; they live on the Reservation; they regard themselves and are regarded by others, as Indian. If the speed factor is social, the Mixed Bloods should resemble the Indians rather more than the Whites; if it is racial, they should resemble the

Whites in the proportion of white intermixture. (This might be only approximately true, depending on the dominance or recessiveness of the "speed factor" in the crossing of White and Indian stock.) Speed Indices were calculated for the Mixed Bloods and these were ranked with the Full Bloods in such a way as to give an order of merit series for each age; the individual ranks were then transmuted into scores by Clark Hull's method.⁹ The results are as follows:

	<i>Mare</i>	<i>N</i>	<i>Healy</i>	<i>N</i>
Full Bloods ¹⁰	49	107	50	86
$\frac{3}{4}$ Indian, or more	52	31	50	25
$\frac{1}{2}$ Indian, or more	48	19	52	18
Less than $\frac{1}{2}$ Indian	46	10	38	10

Results obtained by this method are, of course, significant only as regards relative position, and not as regards amount of difference. They show, indeed, that the group of 10 subjects who were less than one-half Indian moved most quickly in both tests (a low score means greater speed), but the slowest group is in one case the " $\frac{3}{4}$ or more" group, and in the other, the " $\frac{1}{2}$ or more" group. The evidence, therefore, is inconclusive, especially because of the few subjects in the "less than $\frac{1}{2}$ group," but it would seem rather to favor the "racial" explanation.

A more direct comparison of speed scores yields similar results, although the presence of some difference in the average age of the groups may affect the results somewhat.

<i>Group</i>	<i>Av. Age</i>	<i>Median I. S. Mare</i>	<i>Median I. S. Healy</i>
Full Bloods	11.3	4.1	4.5
$\frac{3}{4}$ or more Indian	11.0	4.5	4.5
$\frac{1}{2}$ or more Indian	11.4	4.5	4.7
Less than $\frac{1}{2}$	12.9	3.1	3.5

Again the "less than $\frac{1}{2}$ " group is quickest, but there is an age difference to account for this result in part, and there is

⁹ See Reference (42) (22).

¹⁰ The information as to degree of Indian blood was obtained from the parents of the subjects.

no gradual progression from "slow" to "fast" as the proportion of white blood increases.

There is, of course, the possibility that the Indian children moved slowly as a result of embarrassment arising out of the unfamiliar experimental situation, and that consequently this did not represent their normal performance. There was no such embarrassment or shyness obvious to the investigator, who was careful to "establish contact" with the subject and to put him as much as possible at his ease before giving him the tests. More tangible evidence of a factor other than embarrassment as being responsible for the results is found in the fact that in the tests which came fourth or fifth in the group, the speed difference was as marked, if not more so, than in those which came first. If embarrassment or shyness were responsible, its effect should diminish as the series progressed, instead of remaining more or less constant throughout.

7. THE RELATION OF SPEED AND ACCURACY

The question arises whether there is an emphasis on accuracy on the part of the American Indian which is responsible for the smaller number of errors. The probability is that the greater accuracy results from the relative lack of speed, and that no additional hypothesis is required. The slower movement, the greater deliberation, would seem to account for the greater accuracy. This suggestion is only in apparent contradiction with the principle, fairly well established in mental measurements, that, other things being equal, the child who works more quickly will usually achieve the better result. The point is that "other things," in this case cultural background, interest in speed, and so forth, are not equal. Within a group, all the members of which are equally anxious to complete the task in a hurry, the correspondence between the quickest solutions and the most "accurate" ones (i.e., those in which fewest errors are made), should be almost perfect. As between two different groups, however, only one of which is anxious to complete the task in a hurry, it is reasonable to assume that very rapid activity, of the "trial and error" va-

riety will lead to more errors than a more careful, more deliberate approach. This is apparently what happens in the case of these groups. The very act of hurrying introduces a great many unnecessary errors.

8. EXPERIMENTAL FINDINGS

If it is true that the hurrying of the white children is responsible for a certain number of their errors, and the greater deliberateness of the Indians responsible for the fact that they make relatively few, it should be possible to reduce the number of errors made by white children by forcing them to make their moves more slowly. This experiment was attempted in the case of New York City children, with the Triangle test. The test was placed before the subject in the usual manner, and the following instructions given: "Now this time, instead of trying to put the pieces in their right places as quickly as you can, I want you to wait until you hear my signal before trying to put the piece in. I shall tap on the table with my pencil once every 10 seconds. When you hear the tap, put the piece where you think it belongs. If you think you have put it in correctly, leave it there, and wait for the next tap before trying the next piece. If you think you have not put the piece in its right place, take it out, and wait for the next tap before trying again. Do you understand?" Whenever the subject failed to understand, the instructions were repeated. There was rarely any difficulty.

The instructions were also varied in other ways, in order to test the effect of various attitudes towards the tests. A second group was instructed not to worry about how long it took to complete the test, but to put the pieces back in their right places with as few mistakes as possible. A third group was given this test first in the series, with the instructions, "Put the pieces back in their right places, please," not a word being said about either speed or accuracy. A fourth group, finally, was given the usual instructions about completing the test "as quickly as possible."

These subjects were 100 white boys, between the ages of 11 and 15, born and bred in New York City; they were for the most part Anglo-Saxon in origin, with a small sprinkling of other nationalities. They are described in greater detail in the next section.

The results follow:

<i>White Group</i>	<i>Instructions</i>	<i>N</i>	<i>Median</i>	<i>Median</i>	<i>Median I. S.</i> ¹¹
1.	10 seconds	20	80 sec.	4 errors	20.0
2.	Errors	27	49 sec.	4 errors	12.3
3.	None	22	32 sec.	6 errors	5.3
4.	Standard	31	41 sec.	10 errors	4.1

These results show a marked diminution in the number of errors both in the group with the "10 seconds" instructions and in the group instructed to make as few errors as possible. These results were perhaps to be expected, but the results for Group 3, which was given the test without any mention of either speed or errors, are not very easy to explain, unless the "speed" instructions are to be regarded as having much more harmful effects upon the scores than is usually believed. As a check on these figures, the New York Negro group, which was being investigated at the same time, was given similar instructions. The results follow:

<i>Negro Group</i>	<i>Instructions</i>	<i>N</i>	<i>Median</i>	<i>Median</i>	<i>Median I. S.</i>
1.	10 seconds	20	80 sec.	4 errors	20.0
2.	Errors	20	77 sec.	9 errors	8.6
3.	None	20	50 sec.	8 errors	6.3
4.	Standard	140	36 sec.	8 errors	4.5

In this case, while the "10 seconds" group again shows a marked drop in the number of errors (interestingly enough the figures for this group are the same for both White and Negro subjects), there is no such drop in either of the other two experimental groups. The number of errors in fact remains almost constant. There is again the regular change in the Speed Index as here used, showing the effect of the instructions on rate of movement. (In Group 1 this rate is, of course, controlled). The drop in the "10 seconds" group, in the case of the Whites from 10 to 4 errors, and in the case of

¹¹ This is a very crude Index of Speed, arrived at by dividing the median time by the median *number of errors*. It refers to the number of seconds which it took for one *error* to be committed (not one *move*, as in the Speed Indices previously employed).

the Negroes from 8 to 4 errors, supports the hypothesis previously suggested to the effect that a slower, more deliberate procedure in the tests, other things being equal, will tend to reduce the number of errors made. The results in the case of the other two types of instructions must be regarded as doubtful in the meantime, except that their effect in decreasing speed of movement seems to be quite definite.

The phrase "other things being equal" deserves a word of comment in this connection. There is, of course, the possibility that in the case of both the White and Negro subjects, the group which was given the "10 seconds" instructions was somewhat superior to the rest, and that this would account for the apparent drop in the number of errors. As a check on this possibility, each subject in the white group was given a "total score" based upon the Pintner-Paterson Point Scale Values (Manual, pp. 176-7) for three tests which every subject was given,—the Mare and Foal test, the Casuist Form Board, and the Healy "A," and the measures of central tendency for each of the above groups was calculated. The results are:

<i>Group</i>	<i>Total Score</i>		<i>Q (dis)</i>
	<i>Median</i>	<i>Av.</i>	
1. (Seconds)	114	115	38
2. (Errors)	122	124	32
3. (No instructions)	91	93	22
4. (Standard)	116	110	43

Groups 1 and 4 are sufficiently similar in their total scores to warrant our conclusion that the difference in the number of errors in the case of the Triangle test can safely be ascribed to the artificial slowness and deliberation introduced by the variation in procedure.

9. TOTAL SCORES OF INDIANS AND WHITES

Returning to the Yakima groups, we have still to compare them in terms of general excellence of performance or total score. Each subject was given a score made up of points allotted according to the Pintner-Paterson Point Scale; the results on six tests,—the four Form Boards previously discussed, the Ship test, and the Knox Cube test,—being included.

Disregarding ages once more, the direct comparison of the two groups gives the following results:

	<i>N</i>	<i>Median</i> ¹² <i>Score</i>	<i>Range</i>	<i>Q</i>
Indians	107	188	35—284	37.5
Whites	101	190	61—290	36.5

These results are strikingly alike in median scores, variability, and even range (if we except the single case of a 7-year-old Indian child who made the very low score of 35; the lower limit of the distribution would then be 71 points). If the comparison had been made in this way, simply in terms of total score, there would have been no demonstrable difference between the two groups. As it is, further analysis of the test results demonstrates that the scores of the two groups are made up very differently, and that the Indian children make up in their scores for "errors" and "moves" what they lose in their scores for "time." This holds true for all four Form Boards, as has been shown. In the case of the other two tests, in which the time factor does not enter, there is nothing to choose between the two groups. The median score for both groups in the Ship test is 19, and in the Knox Cube test, 7. It would seem important to bear in mind, therefore, that the comparison of groups in terms of total score, made up of various types of performance, may hide interesting qualitative differences which will emerge upon more detailed analysis. In addition, the comparison of groups, tested with Form Boards, on the basis of *one or the other* of the two criteria, namely, time and errors, may do great injustice to one of the groups. The procedure in a recent study of Southern Negroes, by V. T. Graham,¹³ who compared the times taken to complete the Healy "A" test with the Pintner-Paterson norms, ignoring entirely the number of moves made, on the assumption that either one of the criteria alone could be used, can hardly be justified, in view of the widely differing environments of the two groups tested. The use of speed alone as a test of excellence of performance, with difficulty kept constant, may be entirely unfair to some groups in which the speed factor does not have the significance which we usually ascribe to it.

¹² The Pintner-Paterson norm for 11 years, which is the median age of both groups, is 211 points.

¹³ Reference (35).

10. TOTAL SCORES OF MIXED BLOODS

One final comparison remains to be made, namely, that of the mixed-blood with the full-blood Indians in terms of total score. As the cases were too few for direct comparison at any one age, they were rated within each age, and given a score based on Clark Hull's formula for transmuting percentile position into score, as in the case of the Speed Indices on p. 38. These scores indicate relative position, therefore, and not amount of difference:

<i>Group</i>	<i>Median Score</i>	<i>N</i>
Full Bloods	47.5	92
$\frac{3}{4}$ or more Indian	55	30
$\frac{1}{2}$ or more Indian	57.5	18
Less than $\frac{1}{2}$	47.5	10

The evidence is somewhat conflicting. There is a correspondence between score and amount of white blood in the first three groups, but the parallelism is disturbed by the fourth group, which is in the same relative position as the first. The fact that there are only 10 cases in this group diminishes the importance of this finding; on the other hand, the excellent showing of the main Indian group (which includes $\frac{3}{4}$, $\frac{7}{8}$, and full-blood Indians), when compared directly with the Whites (see p. 43), argues against any causal connection between excellence of results and degree of white blood as far as these subjects and these tests are concerned.

SUMMARY

1. Six tests in the Pintner-Paterson series,—four Form Boards, the Ship test, and the Knox Cube test,—were given to 120 Indian and 107 white children, aged 7 to 16 years, on and near the Yakima Indian Reservation, during July and August, 1926.
2. With all four Form Boards, Indian children take longer time but make fewer errors.
3. Speed Indices show that the Whites move faster than the Indians.
4. The differences in speed correspond to differences in economic and cultural environment.

5. Racial differences in basal metabolism are a possible explanation of the differences in speed, but the evidence is inconclusive; it may be that the differences in metabolism and in speed are due to similar social and environmental factors.

6. Comparison of Speed Indices in Full and Mixed Bloods show no regular increase in White blood, but subjects with least Indian blood move most quickly.

7. The smaller number of errors is explained by the indifference to speed. New York City children could be made to reduce the number of errors in the Triangle test by slowing up their performance.

8. Comparison of Indian and White groups in terms of total number of points obtained in the Pintner-Paterson Point Scale shows no difference between the two. This illustrates the need of further analysis of group test scores.

9. The use of speed alone or errors alone as a criterion of excellence may be unfair to one group. The former criterion is particularly unfair to groups which have not been accustomed to hurry.

10. Comparison of Mixed Bloods with Full Bloods in terms of total score shows that those with the most and those with the least Indian blood have lower scores; clear evidence of correspondence of score with degree of White blood is lacking.

III. THE NEW YORK NEGROES

1. THE SUBJECTS AND THE TESTS

Two hundred Negro and 100 White boys between the ages of 11 and 16, living in New York City, were given the four Form Board tests used in the case of the Yakimas,—the Mare and Foal test, the Casuist Form Board, the Triangle test, and the Healy "A,"—during the academic year, 1926-27. This part of the investigation was undertaken primarily in the attempt to throw some light on the environmental or racial determinants of the speed factor; incidentally certain other aspects of the problem of racial psychology were also studied. The Negro boys were all pupils at a junior high school in Harlem, P.S. 139, and all living in Harlem. Their previous environmental background varied considerably. Many of them were born in New York City and had lived there all their lives; others had come from cities and towns in the South and in the West Indies, some within the year, others several years ago. Their economic and social status was also varied, but was on the whole probably inferior as compared to White standards. The tests were administered in one of the rooms in the school. Through the kindness of the principal, Dr. Jacob M. Ross, and the various teachers, each boy was excused from class long enough to take the tests. The subjects were all in the 7th and 8th grades. The method of choosing the subjects was to look over the names and records in the school card index, and to pick out the names of these boys who evidently had not been born in New York; this information could usually be obtained from the cards. In addition a group of New York boys was also chosen quite at random, by taking about 30 names from the first part of the alphabetical list, and the same number from the last part. The group was probably a very fair sample of the population of P.S. 139, and probably also of Harlem in general, although this latter statement cannot be proven.

There was no attempt made to obtain a White group which should be "typical" of New York City, as it was felt to be quite impossible to decide just what such a group would be. Nor was the attempt made to find a White group which should be equal to the Negro group in social status and educational op-

portunity, as this, too, for reasons discussed above, was felt to be impossible. The choice of any New York group could be challenged on many grounds, if any direct comparison, with a view to demonstrating "racial" differences or similarities in intelligence, were contemplated. However, in this investigation, no such comparison was to be made, except incidentally. The primary interest was in the question of speed, and it was felt that for this purpose, the choice of the particular group did not matter quite so much.

Of the 100 White boys, 36 were from the Neighborhood Settlement House, 422 W. 57th St.; 32 from the East Side Y. M. C. A., 153 East 86th St.; and the remaining 32 from the Hudson Guild, 426 W. 27th St. They all belonged to the clubs connected with these various institutions, and were tested in the late afternoons and the evenings, when the meetings of the clubs were held. They all went to school, the range of grades extending from the 6th to the 9th grades. About 80 of them were of North European origin,—English, Scotch, Irish, and German. The remainder contained a sprinkling of Poles, Jews, Italians, Russians, etc. *They were all born and bred in New York City.* They were a healthy, active lot, evidently interested in athletics and the social life which the clubs had to offer. Their social and economic status would probably be classed as "average" or "inferior," but not as "very inferior"; none of them was from the "superior" or "very superior" class.

The age of the Negro and White groups, while ranging from 11 to 16 years, is so nearly alike that for most purposes it will be convenient to compare them directly without regard to the difference in age within each group. The age distribution of the two groups is as follows:

Age	Negro	White
	%	%
11	8.5	12
12	14	23
13	29	21
14	29	26
15	16	16
16	2.5	2
Mdn.	13 yrs.	13 yrs.
Av.	13.39 yrs.	13.14 yrs.
Q	0.5	1.0
Range	11—16	11—16

2. SPEED AND ENVIRONMENT

The Negro group was divided into 4 sub-groups as follows: Group 1 contained those boys who had lived less than one full year in New York; most of these came from the South; Group 2, those who had lived at least one year, but not more than 5 years in New York; Group 3, those who had lived more than 5 years in New York, but had been born elsewhere; Group 4, those born and brought up in New York.

This division was made in an attempt to throw some light on the problem raised in the previous section, namely, the relation between environment and speed. If the speed factor is wholly or mainly racial, it should be fairly constant within the same racial group, no matter what the environment may be in which such a group is tested. If, on the other hand, it is wholly or mainly environmental, it will differ widely within the same racial group, to the extent that the environment of this group differs. In the case of the Negro, it was felt that a comparison of a New York group with a Southern group might be of interest in this connection, in view of the very different "rate of living" in New York and in the South. More particularly it was felt that tests on Southern or rural Negroes who had recently migrated to New York might be especially valuable.

Against a direct comparison of Negroes in New York and in the South it might conceivably be urged that a kind of selection operates which causes a cityward migration of those who welcome an existence with a quicker tempo, while those who are not naturally in harmony with it will avoid it. Instead of the environment increasing the speed, therefore, the differences in speed would be primary, and the environment would in part be chosen as a consequence. It is probably a mechanism of this type which leads visitors to New York to say that they like the city for a short while, but that they could not live in it, that life is too hectic, too restless, to suit them for any length of time, and so on. Such an argument, whatever its value, can hardly be urged against a comparison of Negro subjects, all of whom (or their families) have migrated to New York, and who differ only in the time at which this migration took place. If any selection on the basis of speed has been operative, it has operated upon all alike. If any

difference is found, therefore, it can be attributed to the fact that the New York City environment has had time to affect certain groups and not others.

3. THE INDEX OF SPEED. RESULTS

Speed Indices, based on results with the Mare and Foal tests and the Healy "A," were calculated in the manner previously described, for the 4 Negro groups and the White group. The results follow:

SPEED INDICES OF NEW YORK NEGROES AND WHITES

Group	<i>I. S.</i>	<i>I. S.</i>	<i>Q</i>	<i>I. S.</i>	<i>I. S.</i>	<i>Q</i>	<i>Mdn.</i>	<i>Av.</i>	<i>N</i>
	<i>Mare</i>	<i>Mare</i>		<i>Healy</i>	<i>Healy</i>				
	<i>Mdn</i>	<i>Av.</i>		<i>Mdn.</i>	<i>Av.</i>		<i>Age</i>	<i>Age</i>	
(1) Less than 1yr. in N. Y.	3.6	3.7	0.6	3.0	3.0	0.4	14	14.1	26
(2) 1—5 yrs.	3.1	3.3	0.7	2.7	2.8	0.5	13	13.6	68
(3) More than 5 yrs. in N. Y.	3.0	3.2	0.5	2.8	2.95	0.55	13	13.2	48
(4) New York born	2.9	3.1	0.55	2.6	2.75	0.55	13	13.0	58
(5) White group	2.9	3.04	0.6	2.3	2.35	0.4	13	13.14	100

This table shows certain small differences between the various groups consistent with the theory that the environment has something to do with the determination of habits of speed. The largest differences obtain between the medians of Groups (1) and (4) in the case of the Negroes. In the case of the Mare and Foal test, the obtained differences between the groups is 0.7, and the PE (diff.) is .172; therefore $\frac{D}{PE (diff.)}$ is 4.07, and there is a statistically reliable difference between the two groups. In the case of the Healy "A" Speed Indices, the difference between the medians of Groups (1) and (4) is equal to 0.4, and the PE (diff.) is .133; the chances in this case are 98 in 100 that there is a true difference between the two groups. It can be seen from inspection of the table that the other differences between the various Negro groups are not quite perfectly reliable, but the differences between the medians of Groups (1) and (3) in the Mare and Foal test, and between Groups (1) and (2) in the Healy "A" test have a high degree of statistical reliability. (Ninety-nine chances in 100, and 95 chances in 100, respectively, that there is a true

difference.) There is good reason to believe, then, that the difference in environment is to some extent at least responsible for "speeding up" the activities of the Negroes, as shown by the lower Speed Indices (and therefore the greater speed) of the New York group.

There is some corroborative evidence obtainable for this point of view from the results with the Casuist Form Board. In this case, only a very crude Index of Speed is available, because the record was kept not of moves, but of errors. The only indication of speed of movement in this case, therefore, is the proportion of time to errors, or in other words the number of seconds in which one error is made. The smaller the proportion of time to errors, the faster the subject has moved, because within that time all the correct moves must also have been made. This Index of Speed is not very satisfactory; the results are included merely as furnishing some additional evidence for the point of view under discussion.

<i>Group</i>	<i>Mdn Seconds</i>	<i>Mdn Errors</i>	<i>Index of Speed (Number of Seconds per Error)</i>
(1) Less than 1 yr. in N. Y.	69	6	11.5
(2) 1—5 yrs. in N. Y.	81	8	10.2
(3) More than 5 yrs. in N. Y.	72	7	10.3
(4) Born in N. Y.	88	9	9.8
(5) White group	61	8	7.5

Again there is evidence of a gradual increase in the speed of movement as length of sojourn in New York increases.

4. DIFFERENCES BETWEEN NEGROES AND WHITES IN SPEED

There is some evidence also for a difference in speed between the Negroes and the Whites. (Only the Negroes born in New York are considered here.) The median Index of Speed in the case of the Mare and Foal test is exactly the same (2.9), but in the Healy "A" test there is a difference of 0.3 between the medians, and one of 0.4 between the averages. The PE (diff.) between the medians is .103, and the $\frac{D}{PE \text{ (diff.)}}$ equals 2.91, which means that the chances are 97 in 100 that there is a true difference between the groups. The evidence from the Casuist Form Board, as can be seen from inspection of the table, points also in the same direction.

This may seem to give some support to the view that there is a racial difference in speed. Otherwise why should there be a difference between two groups, both born in New York, and apparently subject to the same environmental influences? The evidence will be weighed more carefully in a later section, when comparisons with other groups of Whites, Negroes, and Indians will be made. It will perhaps be sufficient to point out here that the Harlem environment certainly is not identical with that of the rest of New York. To put one's finger on the exact difference, however, is not such an easy matter. In fact, it is not even possible to state definitely that the environments differ with regard to the speed factor, although this is probable; it will perhaps suffice at this point to note that the environments do differ, and that therefore an observed difference (like that in speed) may be due to environmental, and not necessarily to racial and hereditary factors.

5. THE TEST SCORES

For reasons which were discussed in an earlier section, the direct comparison of two racial groups, on the assumption that they represent fair samples of the whole racial population, and on the further assumption that such tests are equally fair to both groups, is always open to question. There is, however, a certain interest in such a comparison in this case, because the performance tests which were used are free from some, *though by no means all*, of the objections which have legitimately been raised against intelligence testing as applied to races.

The first table contains the results of the various Negro groups on three tests,—the Mare and Foal test, the Casuist Form Board, and the Healy "A."

MEDIAN SCORES OF NEGRO GROUPS

Group	N	Mare and Foal		Casuist Time	Casuist Errors	Healy "A" Time	Healy "A" Moves
		Time	Errors				
(1) Less than 1 yr.	26	31sec.	2	69 s.	6	73 s.	24
(2) 1—5 yrs.	68	30sec.	2	76 s.	8	88 s.	31
(3) More than 5 yrs.	48	30sec.	3	72 s.	7	146 s.	39
(4) New York born	58	28sec.	2	88 s.	9	79 s.	30

Inspection of the table shows no decided superiority of any one group over all the others; Group (1) makes a somewhat better showing in the Casuist Form Board and the Healy "A," and Group (4) a slightly better record in the Mare and Foal test; Group (3) makes a relatively poor showing on the Healy "A." These fluctuations in the record probably do not have any real significance.

Comparisons between the whole Negro group and the whole White group are available in 5 tests,—the three mentioned above, and in addition the Triangle test and the Knox Cube test. The procedure in the Triangle test was varied in order to demonstrate the effect of various types of instructions, and to throw some light on the question of the relation of speed and accuracy (see preceding section, p. 40), and there were too few cases with "standard" instructions to permit of subdivision into environmental groups. The Knox Cube test was not given to all the subjects, nor was the subdivision into groups regarded as significant in the case of this test.

The results on each test for the groups as a whole follow:

NEGROES

<i>Test</i>	<i>N</i>	<i>Median</i>	<i>Q</i>	<i>Median Errors or Moves</i>	<i>Q</i>
Mare and Foal	200	30 sec.	7	2	1.5
Casuist	200	76 sec.	29	8	4.5
Healy	200	91 sec.	75.5	30	23
Triangle	140	36 sec.	17	8	5.5

Knox,—Med. 7, Av. 7.28, Q. 1.5
N. = 151

WHITES

<i>Test</i>	<i>N</i>	<i>Median Time</i>	<i>Q</i>	<i>Median Errors</i>	<i>Q</i>
Mare and Foal	100	27 sec.	6.5	2	1.5
Casuist	100	61 sec.	28.5	8	6
Healy	100	59 sec.	48.5	24	20.5
Triangle	32	41 sec.	29.5	10	7

Knox,—Med. 7, Av. 7.75, Q. 1.0
N. = 61

There are 9 comparisons here, four for time, four for errors, and one for the Knox Cube test. Out of these 9, the Whites have better scores in 4, the Negroes have better scores in 2, and the scores are equal in 3. The advantage is slightly in

favor of the Whites. If points are given for these median scores on the basis of the Pintner-Paterson Point Scale, the Negro score is 162, and the White score, 174. The Pintner-Paterson median score for 13 years (which is the median age of both groups) is 224, which is considerably higher than either the White or the Negro score. Why this should be it is difficult to say. There is always the possibility that differences in the procedure of the tester, his method of counting errors, and so on, as well as the rather inferior social and economic status of the two groups, may have had something to do with the result.

When in this case also analysis is made of the relative influence of speed and accuracy in determining the total score of each group, the result is of considerable interest. Of the 9 median scores in the last table, 4 are scores for time, and 5 are scores for accuracy, viz., errors and moves in the four Form Boards, and, in addition, the Knox Cube test. On the 4 "time" scores, the Negroes made 80 points and the Whites 92; on the 5 "accuracy" scores, the Negroes made 82 points, and the Whites 82. Whatever superiority was shown by the Whites was entirely in the *time* it took to complete the tests. There is, of course, no marked qualitative difference of the type which was found in the case of the Yakima Indians. The performance of the Whites and Negroes in New York was essentially of the same character. The fact remains that the superiority was one of speed only, and that if the difference in speed is due, as it may be, to a different *attitude towards speed* rather than to a racial difference in ability to do things quickly, all of the superiority of one "race" over another vanishes.

6. THE NEGROES CLASSIFIED ACCORDING TO COLOR

In a recent paper by Herskovits¹⁴ the statement is made that a logical implication of the hypothesis of the superiority of the Whites over the Negroes is "that in a mixed Negro group, such as we have in the United States, those individuals having the largest amount of white ancestry should on the average stand higher in tests, other things being equal, than persons of total or large amounts of Negro ancestry." This

¹⁴ See Reference (40).

implication has been accepted by Ferguson¹⁵ as well as by Herskovits. Ferguson, working with Virginia school children, and later with Negro draftees during the war, divided his groups in the former case "on the basis of racial purity as indicated by color of skin, hair texture and general facial and cranial conformation, the main emphasis being placed upon color"; he entitled his groups "pure Negro," " $\frac{3}{4}$ Negro," "mulatto," and "quadroon," and found a gradual improvement in the test scores as the degree of Negro blood decreased. Herskovits, on the other hand, working at Howard University, Washington, D. C., used anthropometric measurements of lip thickness, nose width, and the black and white elements in skin pigmentation (the procedure will be described in the next section, in connection with the study of a rural Negro group in West Virginia), and found by the Pearson product-moment correlation method, that there was no inverse correspondence between the amount of Negroid traits and the results on the Thorndike College Entrance Examination.

The Negroes tested in New York were divided into 4 groups, using as nearly as possible Ferguson's criterion, but without subscribing to Ferguson's use in this connection of the terms "quadroon," " $\frac{3}{4}$ Negro," etc., which have been shown by Herskovits and others to be unwarranted. The 4 groups were simply divided on the basis of degree of Negroid appearance; Group 1 being apparently pure Negro, and Group 4 having evidently a good deal of White intermixture; just how much it is, of course, impossible to say. Groups 2 and 3 were intermediate. There were undoubtedly many subjects placed in the "lighter" groups who were more Negro than some who were placed in the "darker" ones, and vice versa, but it probably remains true that on the whole the four groups corresponded to four different degrees of Negro blood, in spite of the cases of overlapping.

Each subject was given a score made up of points awarded according to the Pintner-Paterson Point Scale, using the results on three Form Boards,—the Mare and Foal, the Casuist, and the Healy "A." Only these three were used, because too many cases were missing from the other two tests, the Triangle test and the Knox Cube test. The results follow:

¹⁵ See Reference (18).

RESULTS ACCORDING TO DEGREE OF NEGRO BLOOD

<i>Group</i>	<i>N</i>	<i>Median</i>	<i>Q</i>	<i>Range</i>
(1) Pure Negro	89	86 pts.	28	24—176
(2) Less Negro than (1)	57	116	31	50—172
(3) Less Negro than (2)	32	102	28	46—164
(4) Least Negro	22	90	31	38—148
(1) and (2) combined	146	97	30	24—176
(3) and (4) combined	54	99	89	38—164

It is obvious that there is no correspondence between degree of Negro blood, as judged by inspection and general Negroid appearance, and the results on the tests. While Group (1), the "pure" Negro group, has the lowest median score, that of Group (4) is almost as low; and the median scores of Groups (1) and (2) combined, and Groups (3) and (4) combined, are practically identical. The lowest and highest scores were both made by members of Group (1), but this probably has no particular significance in this case.

The reason for the discrepancy between this result and that obtained by Ferguson is to be found in the different character of the tests used. Ferguson agrees that the lighter Negroes come for the most part from a better social class than the darker Negroes, and this difference in background would have a much more pronounced effect in the case of his tests than in the case of the Form Boards, which are relatively (though by no means absolutely) free from educational influences.

The statement of Herskovits, that it is a logical implication of the doctrine of white superiority, that in a mixed Negro group those individuals having the largest amount of white ancestry should on the average stand higher than the pure Negroes, cannot be accepted without some qualification. The correlary is only a logical implication on the assumption that the "white" blood which has been mixed with the Negro comes from average or "normal" or "standard" white stock. This is a large assumption. It could be argued with some justice that this white stock is inferior, and that therefore this comparison of mixed with pure bloods is irrelevant. It might very well be that the white stock which united with the Negro was inferior to the Negro stock, even though the average white stock was superior. The same problem arises in connection with the American Indian. What is needed is a thor-

ough sociological study of intermarriage in these groups, and even that would probably be entirely unsatisfactory, because it would leave out of consideration the extra-marital associations which are partly responsible for the present mixed groups. In the case of these non-marital associations, it would probably be difficult to prove that, judged by ordinary standards, the white stock was inferior. It may even have been superior. We might probably have to come to the conclusion that, on the whole, the white stock was about average. At present, however, this must remain an assumption, and any argument based upon this "logical implication" will therefore remain open to some slight question.

SUMMARY

1. Five tests—Mare and Foal, Casuist Form Board, Healy "A," Triangle test, Knox Cube test—were given to 200 Negro and 100 White New York boys, aged 11 to 16 years, between November, 1926, and April, 1927.

2. There was found to be a close correspondence between length of sojourn in New York, and speed of movement in the tests. Those Negroes who had recently come from the South moved most slowly, and the New York group most quickly. It is suggested that the speed factor in performance is largely environmental, not racial.

3. In two out of three Form Boards, there is evidence for greater speed on the part of the New York Whites than on the part of the New York Negroes.

4. Comparisons of the median scores of the whole groups in the various tests shows some superiority of the Whites over the Negroes. On the Point Scale, the Whites have 174, and the Negroes 162 points.

5. Analysis of this result shows that all the superiority is due to shorter times made on the Form Boards; the scores for accuracy are equal.

6. The division of the Negro group into four sub-groups, based on degree of Negroid appearance, shows no correspondence between superior ranking on the tests and smaller amount of (apparent) Negro blood.

7. The significance of this result depends on the assumption, as yet unproven, that the White stock, in Negro-White crossing, is "typical" or "average" White stock.

IV. THE WEST VIRGINIA NEGROES

1. THE SUBJECTS AND THE TESTS

During June and July, 1927, tests were given to a group of Negro children living in villages and rural communities within twenty miles of Martinsburg, West Virginia, in the north-eastern part of the state, about 90 miles west of Washington, D. C. The children in Martinsburg (which has a population of about 15,000) were not tested, but the work was done in smaller communities like Johnstown, Kearneysville, Nipetown, Bessemer, Shepherdstown, Harpers Ferry, Bolivar, Halltown, Darke, and Charles Town (not to be confused with Charleston, the capital of the state), all in West Virginia. None of these communities has a population exceeding 3,000, and most of them are very much smaller. For the most part they are farming communities; the lime quarries in the neighborhood, and day labor on the railways and the roads, also give employment to many.

The subjects were chosen absolutely at random in this case also, by visiting from house to house in these various communities, and testing all the children between the ages of 7 and 16 years, who could be found. This work would have been impossible without the cooperation and assistance of Mr. Louis E. King, a graduate of Howard University, who has done graduate work in Anthropology at Columbia University, and has conducted some investigations on the physical anthropology of the Negro in Harlem as well as in these rural West Virginia communities. Not only was Mr. King responsible for the personal contacts which made access into the Negro homes possible, but he also took all the physical measurements of which use is made in this study, and assisted materially in the administration of the tests. It is perhaps not unimportant to add that his presence must have done much to reduce the feeling of embarrassment which many Negro children have in the presence of a white tester, and to aid in the establishment of that rapport which is an essential to fair testing.

The tests given were twelve tests in the Pintner-Paterson series,—the Mare and Foal, the Seguin, the Five Figure Board, the Two Figure Board, the Casuist Form Board, the

Triangle test, the Healy Puzzle "A," the Manikin test, the Feature Profile test, the Ship test, the Healy Picture Completion test, and the Knox Cube test. Later it was discovered that an error had been made in the case of the Seguin Form Board, and that the subjects had been allowed to sit instead of stand during this test; as this made comparison with the Pintner-Paterson norms impossible, the results on this test were not included in most of the computations. The physical measurements included among others, the Lip Thickness, the Nose Width, and the Pigmentation as indicated by the Milton-Bradley color top.

2. THE I.Q.'S OF THE WHOLE GROUP

By the method of the Median Mental Age,¹⁶ Intelligence Quotients were computed for all subjects between the ages of 7 and 15. As a matter of fact, Intelligence Quotients based on Pintner-Paterson norms are really of no value at the higher ages, because it becomes progressively much more difficult, and finally impossible, to obtain a high I.Q. For example, a subject aged 15 cannot obtain a mental age above 15, no matter how well he does on the tests; the maximum I.Q. at that age is therefore 100. The better subjects at the higher ages undoubtedly obtain lower I.Q.'s than they deserve.

The distribution of I.Q.'s according to age follows:

Age	7	8	9	10	11	12	13	14	15
N.	5	7	23	18	13	14	24	12	13
I.Q. median } median }	86	88	83	92.5	82	63	86	82.5	73 (?)

For the group as a whole, consisting of 129 cases, the median I.Q. is 83, with a Q of 12 points. Twenty-seven subjects, or 21%, had an I.Q. reaching or exceeding 100. The range was from 40 (obtained by a boy of 15) to 130 (obtained by a girl of 10, who had a M.A. of 13.)¹⁷

These results may seem to argue in favor of a racial dif-

¹⁶ See Reference (60).

¹⁷ For facility in computation, the age nearest birthday, rather than actual age in years and months, was used.

ference such that the median performance of the Negro child is only 83% as good as that of the median White child (as indicated by the Pintner-Paterson norms). It is clear, however, in view of the preceding discussion, that such a conclusion cannot be accepted without much question. In the first place it is a far cry from rural West Virginia to the City of Columbus, Ohio, where the Pintner-Paterson norms were collected. If, as seems obvious, the background and the training of the child have no inconsiderable influence on the standing in the intelligence tests, the West Virginia children can hardly be expected to have a median I.Q. of 100. In the second place, the personal equation of the investigator enters here to such an extent that the comparison of his own results with norms obtained by others must always be a somewhat doubtful procedure. In the records for time, this personal element is probably not of very great importance, but in the records for errors it is extremely difficult to standardize the procedure in such a way that all observers will obtain the same result. In the case of the present investigator, all the groups tested, with the exception of the Yakima Indians, made relatively better scores for *time* than for *errors* when compared with the Pintner-Paterson norms; this may have been due to the different behavior of his subjects, or it may have been due to the fact that he interpreted errors more strictly than did Pintner and Paterson and their associates. In any case, it would seem advisable always for each investigator to obtain his own comparative data wherever possible, at least as far as "errors" are concerned, rather than to rely for comparative purposes upon data obtained by others.

In the present case, the comparative data, owing to the pressure of time in West Virginia, are very meager. They consist of tests made on 25 White subjects, ranging in age from 8 to 15, living in Harpers Ferry and Bolivar, West Virginia, chosen as much at random as possible, with the aid of two high-school students who knew all the children in the vicinity; they were given the same tests in the Pintner-Paterson series as the Negro children. Although the number of cases is small, the results are interesting. They show a median Intelligence Quotient, not of 100, but of 88, with a Q of 15, and a range of 46—123. Eight subjects, or 32% reach or exceed an I.Q. of 100. If, as is very probable, this median of 88 represents ap-

proximately the true median of the group [naturally the unreliability is great; PE (mdn) is 3.75 points] then the intelligence of the Negro is not 83% that of the Whites, but 83/88 or 94.5%, which is a vastly different matter. Thirty-eight per cent of the Negroes reach or exceed the White median, and 56% of the Whites reach or exceed the Negro median. There is still a difference in favor of the Whites, but its proportions have dwindled very considerably.

If now we consider the results obtained by the younger children, namely, those who were 10 years old or less at the time they were tested, we find that the Negroes do somewhat better when compared with the Pintner-Paterson norms. The 53 subjects in this younger group obtained a median I.Q. of 88 (as compared with 83 for the whole group), with an average I.Q. of 88.2. Sixteen subjects, or 30%, reached or exceeded an I.Q. of 100 (as compared with 21% of the whole group). There were only nine White subjects aged 10 or less; their median I.Q. was 90, and their average 94.8. Obviously, the results obtained on a group as small as this mean nothing.

In interpreting Pintner-Paterson I.Q.'s, it should be borne in mind that different methods of arriving at the I.Q. may give entirely different results. In a recent study of Oriental children by Sandiford and Kerr,¹⁸ it was pointed out that mental ages based on the Median Mental Age method are considerably lower than those obtained by the Year Scale, and also slightly lower than those obtained by the Point Scale. The group of Japanese boys tested by them had a median mental age of 11.0 years by the Year Scale, 8.82 years by the Point Scale, and only 8.5 years by the method of Median Mental Age. In the case of the present study, the method of Median Mental Age was preferred, because this made it possible to arrive at separate I.Q.'s based on "time" scores and on "accuracy" scores. (See next section.) For comparative purposes, however, mental ages were computed for all 10-year-old Negro children by the Year Scale method. The difference obtained by the two methods is similar to that obtained by Sandiford and Kerr. The median mental age by the Median Mental Age method is 9.2 years, and by the Year Scale method, 11.5 years; the averages are 9.1 and 11.0 respectively. (N = 18.)

¹⁸ See Reference (71).

3. THE "TIME" AND "ACCURACY" I.Q.'S

For the purpose of this study, the results in terms of median or average I.Q. are less important than their analysis into "speed" and "accuracy" components. For each subject, two I.Q.'s were computed by the Median Mental Age method, one based on the scores for time, the other on the scores in which the time factor did not enter. Thus the first I.Q. was based upon the median mental age derived from the time scores on the Mare and Foal test, the Five Figure Board, the Two Figure Board, the Casuist Form Board, the Triangle test, the Healy "A", and the Feature Profile test; the second I.Q. was based on the median mental age derived from the scores for errors in the first five of these, the number of moves made in Healy "A," the points obtained on the Ship test, the Picture Completion test, the Knox Cube test, and (in the case of subjects 8 years and under) the Manikin test. For convenience they will be referred to as the "Time I.Q." and "Accuracy I.Q."

The results bear considerable resemblance to those obtained in the case of the Yakima Indians and the New York Negroes. They are summarized in the following table:

"TIME" AND "ACCURACY" I.Q.'S

	<i>N</i>	<i>Median Time I.Q.</i>	<i>Q</i>	<i>Range</i>	<i>Median Accuracy I.Q.</i>	<i>Q</i>	<i>Range</i>
Negroes	129	89	13.5	42—144	78	11.5	40—122
Whites	25	100	14	42—156	73	12.5	47—125

There is once more the evident superiority of the Whites in the time scores, and on this occasion also some superiority of the Negroes in the accuracy scores. It appears that again all the "superiority" of the Whites lies in their greater speed, while there is no such superiority, and in fact a possible inferiority, in those scores in which the speed factor does not enter.

This will probably seem like a very large inference to draw from a comparison of Negro scores with only 25 White cases. The results are included, however, as *suggesting*, if not *demonstrating*, the possible direction in which the difference between the groups, which has led to the hypothesis of White superiority, is to be found.

4. NEGRO AND WHITE SPEED INDICES

Speed Indices were calculated for the Negro and White groups in the same manner as before (see p. 32), in the case of the Mare and Foal test and the Healy "A." The results follow:

SPEED INDICES OF NEGROES AND WHITES

	<i>Median</i> <i>I. S. Mare</i>	<i>N</i>	<i>Q</i>	<i>Range</i>	<i>Median</i> <i>I. S. Healy</i>	<i>N</i>	<i>Q</i>	<i>Range</i>
Negroes	3.9	139	.85	2.1—7.8	3.0	135	.65	1.8—15.9
Whites	3.6	25	.55	1.7—12.5	2.6	25	.60	1.6—5.8

The table shows a consistent difference between the two groups, the Whites having a lower Index, and therefore greater speed, than the Negroes. This of course fits in with the results reported in the preceding section.

The distribution of Speed Indices by age, in the case of the Negroes, is shown in the following table:

MEDIAN SPEED INDICES BY AGE

<i>Age</i>	7	8	9	10	11	12	13	14	15	16
I. S. Mare	4.2	5.2	4.1	4.5	4.7	4.0	3.7	3.7	3.2	3.2
I. S. Healy	3.4	4.0	2.9	2.8	3.2	3.1	2.9	2.9	2.8	3.4

The results in the case of the Mare show a gradual tendency for speed to increase with age, but the Healy "A" results are indefinite as far as age differences are concerned.

It is perhaps appropriate to discuss at this point a difficulty which is frequently overlooked when Negro and White environments are "equated" in an attempt to reveal the differences which are due to race. Let us suppose that within the White group it has been demonstrated that there are certain differences which are a function of the size of the group, for example, that speed of performance increases, or that scores on the tests improve, as the group becomes larger. Now let us suppose, further, that we are comparing Negro and White children who live in the same city, say with a population of 20,000. Have we "equated" for the size of the group? It should be obvious that the answer to this question must be in the negative, but much of the argument about the intelligence

of the Negro has ignored this fact. If in a Southern city of 20,000 there is a Negro population of 3,000, then the size of the group in which the Negro lives is only 3,000. (This need not necessarily be true in the North, but in the South the rest of the city is for most purposes closed to the Negro.) The size of the group in which the White child lives is 17,000. This may be a slight over-statement of the case as far as the Negro is concerned, because he does obtain some of the advantages which a city of 20,000 may possess. On the whole it remains true, however, that he lives in a community of 3,000 persons; not of 20,000. So in these West Virginia communities, where the Negro usually constitutes somewhere around 25% of the population, he may be said to live in a group consisting of this 25%; the group in which the White child lives consists of the remaining 75%, and hence is three times as large. We have not by any means equated for the size of the groups; if the size of the group is a factor in determining speed or intelligence scores, we have not ruled out that factor in our study of "racial" differences. It must be borne in mind in interpreting differences in scores such as are included in the preceding tables, and which are quite consistent with the view that the environment and the size of the group are important factors in determining differences in speed.

5. SPEED INDICES OF WEST VIRGINIA AND NEW YORK NEGROES

A comparison of Speed Indices of the Negro groups in West Virginia and in New York City reveals a difference which is also consistent with the view that environment is responsible for speed. The following results include only the subjects who are twelve years old or more, so that any slight difference in age between the groups may safely be disregarded.

In both cases the Index is higher (i.e., there is slower movement) in the West Virginia group. The $\frac{D}{PE \text{ (diff)}}$ for the

SPEED INDICES OF NEW YORK AND WEST VIRGINIA NEGROES

<i>Group</i>	<i>Median</i>			<i>Median</i>		
	<i>I. S. Mare</i>	<i>N</i>	<i>Q</i>	<i>I. S. Healy</i>	<i>N</i>	<i>Q</i>
West Virginia Negroes	3.6	73	.75	2.95	72	.6
New York Negroes	2.9	50	.55	2.6	50	.55

Mare and Foal Index is 4.7; there is a reliable difference between the groups. With the Healy "A" Index, the $\frac{D}{PE \text{ (diff)}}$ equals 2.7, and the chances are 97 in 100 that there is a real difference.

There is of course a possibility that some sort of selective factor operated in such a manner as to cause the speedier Negroes to migrate to New York City. There is the further possibility that the racial constitution of the two groups, particularly the proportion of white blood, differed in such a way as to bring about this result. Since there is no definite evidence, however, for either of these factors, by far the most probable explanation is that the difference in environment is responsible.

6. "INTELLIGENCE" AND NEGROID TRAITS

In a recent study by Herskovits¹⁹ it was demonstrated that certain physical characteristics, more particularly Lip Thickness, Nose Width, and Pigmentation of the Skin, can to some extent be utilized for separating groups of Negroes of unknown origin; the overlapping is so great that these traits are by no means diagnostic in individual cases, but on the whole it is true (as shown by agreement with the genealogies) that those groups with thicker lips, wider nostrils, more black and less white in their skin, are closer to being "Pure Negroes" than those found at the other end of the distribution in these traits.

The measurement of Lip Thickness is taken with the sliding caliper, and is the distance between the outer edges of the lips at the center of the mouth. The Width of Nostril is also measured with the sliding caliper and is the greatest width of the alae when at rest. Skin color is measured by the Milton-Bradley color top;²⁰ the proportions of black, white, red and yellow are varied until the spinning of the top gives a color as nearly as possible identical with that of the skin on the outer aspect of the upper arm of the subject. The arm is covered by a white paper which contains a circular opening about 1½ inches in diameter through which the skin can be seen, and the

¹⁹ See Reference (40).

²⁰ Todd (76).

top is also spun upon white paper, so that the backgrounds are equalized. The skin color is expressed in terms of percentages of black, white, red, and yellow. The measurements are subject to a personal error of observation, which in this case was minimized by the fact that all the observations were made by the same investigator, Mr. King. There are certain other difficulties, also, but this is "the best, and indeed the only quantitative method for the determination of skin color which has been produced to date."^{20a}

In computing the correlations and correspondences (or lack of them) between the various physical measures and "intelligence," a difficulty arose from the fact that there are gradual changes in physical characteristics with increasing age. The lips become thicker and the nostrils wider as age advances (there are no regular changes in skin color) and a correlation between such physical measurements directly with measures of intelligence would be partly spurious as a result.

The measure of intelligence used was the total number of points made on all the tests according to the Pintner-Paterson Point Scale. (This is a better measure than the Intelligence Quotient, which is most unsatisfactory at the higher ages, for reasons considered above.) This measure is, however, markedly influenced by age, at least until 13 or 14 years and possibly beyond.

Three methods were used in order to eliminate the effect of age upon the results; they can be illustrated in the case of Lip Thickness. The first method was to take the Pintner-Paterson scores *at each age*, and divide them into three groups, the first containing the best 25% (approximately), the second the middle 50%, and the third the poorest 25%; the best 25% of *all age groups* were combined into one group, the middle 50% of all age groups were combined into a second, and the poorest 25% into a third; the median and average Thickness of Lips for the members of each of the three groups were then computed. If there were eight subjects in any one age group, the two best would go into Group I, the next four into Group II, and the last two into Group III,—and so at every age. The age distribution for each of the three groups is thus exactly the same (or very nearly so); all three range from 7 to 16 years

^{20a} Herskovits.

and all three have the same proportion of subjects at any one age. It is thus permitted to state whether the more intelligent group has, on the whole, lips which are thicker, thinner, or equal in thickness to those of the less intelligent groups. Conversely, one may start with the measures of Thickness of Lips, combining the 25% at each age who have the thickest lips into one group, (and so on for the other two groups), and then computing the median or average score on the Pintner-Paterson scale for each of the three groups.

A second method was to hold age constant by partial correlation. Pearson r 's were computed between Total Score on the tests and Thickness of Lips, between Total Score on the tests and Age, and between Thickness of Lips and Age. Then by the method of partial correlation, the r between Total Score on the tests (or Intelligence) and Thickness of Lips, with Age held constant, was computed.

A third method eliminates the effect of age by making a correction for it. Norms for Lip Thickness and Nose Width at each age have been worked out for a large series of cases by Herskovits,²¹ and with the aid of these, each subject can really be given the Lip Thickness or the Nose Width which he would have if he were of any given age. The medians of 11-year-old boys were used as a standard. If the medians of 9-year-old boys, according to the results obtained by Herskovits, are 1 millimeter smaller than those of the 11 year old boys, the age factor can be eliminated by adding 1 millimeter to the measurements obtained in the case of every 9-year-old boy. Similarly at every age. In the case of the older groups, a constant amount is subtracted; in the case of the younger groups it is added. The correction can also be made for sex, as the female norms are slightly lower (usually about 1 millimeter) than the male for the same age. In essence, what happens here is that every subject, of whatever age and of either sex, is turned for purposes of computation into an 11-year-old boy. The measurements of Lip Thickness and Nose Width, corrected in this way, can then be correlated directly with intelligence. This method was not used in the case of Pigmentation, as there is no regular or progressive change in Pigmentation with age.

²¹ Unpublished manuscript on "The Anthropometry of the American Negro."

7. "INTELLIGENCE" AND LIP THICKNESS

According to the first method, the intelligence scores were divided into three groups, containing the best, the intermediate, and the poorest subjects, respectively, at all ages. The results follow:

<i>Group</i>	<i>N</i>	<i>Median Lip Thickness</i>	<i>Average Lip Thickness</i>	<i>Q</i>	<i>Range</i>
I. Best 25%	35	21 mm.	20.94 mm.	2.0	12—29
II. Middle 50%	69	21 mm.	21.6 mm.	2.7	13—29
III. Worst 25%	35	21 mm.	21.9 mm.	1.5	16—28

The medians are equal, but the averages show very slight progression of the type which we would expect according to the hypothesis that intelligence increases as Negro blood decreases. The range of the three groups suggests that the worst scores were not made by either the very thin-lipped or the very thick-lipped subjects.

Using Lip Thickness as a basis for dividing the group, the following results were obtained:

<i>Group</i>	<i>N</i>	<i>Median Score</i>	<i>Average Score</i>	<i>Q</i>	<i>Range</i>
I. Thickest Lips	36	306	304.2	66.5	157—457
II. Intermediate Group	67	280	298.7	72.01	92—476
III. Thinnest Lips	36	323.5	312.3	61.0	113—463

Group III (presumably less Negro) shows a certain superiority over Group I. Group II, however, which is presumably intermediate in amount of Negro blood, has the lowest score.

The $\frac{D}{PE \text{ (diff)}}$ between the medians of Groups I and III equals 0.88, and the chances are 73 in 100 that there is a true difference between these two groups.

The correlations are as follows:

1. Between Intelligence and Thickness of Lips r = 0.11
 2. Between Thickness of Lips and Age r = 0.35
 3. Between Intelligence and Age r = 0.54
 4. Between Intelligence and Thickness of Lips, with Age held constant r = -0.10
- N = 139 in every case.

When the age factor is eliminated according to the third method described above, the Pearson r is equal to -0.068 . This is hardly proof of an inverse relationship between Intelligence and Thickness of Lips.

8. "INTELLIGENCE" AND WIDTH OF NOSTRILS

The first table gives the median and average Nose Width for the groups classified according to intelligence.

Group	<i>N</i>	Median Nose Width	Average Nose Width	<i>Q</i>	Range
I. Best 25%	35	37 mm.	37.0 mm.	2.5	31—44
II. Middle 50%	69	36 mm.	36.1 mm.	2.0	31—43
III. Worst 25%	35	37 mm.	37.1 mm.	2.5	30—44

There is obviously no evidence here for any relationship.

The next table gives the median and average number of points on the Point Scale obtained by the groups classified according to Nose Width.

Group	<i>N</i>	Median Score	Average Score	<i>Q</i>	Range
I. Widest 25%	34	293.5	305.1	66.5	114—476
II. Middle 50%	72	300.0	297.1	62.5	92—463
III. Narrowest 25%	33	313.0	303.8	64.5	113—449

In this case the medians do give some evidence of white superiority, but the differences are slight, and they do not hold in the case of the averages. The $\frac{D}{PE \text{ (diff)}}$ between the medians of Groups I and III is equal to .99, which means that the chances are 75 in 100 that there is a true difference between the groups.

The following correlations were obtained:

1. Between Intelligence and Nose Width $r = 0.29$
2. Between Nose Width and Age $r = 0.61$
3. Between Intelligence and Age $r = 0.54$
4. Between Intelligence and Nose Width with
Age held constant $r = -0.06$

When the age factor is eliminated by making the appropriate correction for age as in the method described above, the correlation between Nose Width and Intelligence equals -0.083 .

9. "INTELLIGENCE" AND PIGMENTATION

The Pigmentation, as measured by the Milton-Bradley color top, is expressed in terms of percentages of black, red, yellow and white. The red is not a true red, but contains 59% black. Hence the value for the black element must be corrected by adding to it 59% of the value for the red. It is this corrected value which is used in the following results.

The first table gives the amount of black pigmentation for the three groups classified according to intelligence.

<i>Group</i>	<i>N</i>	<i>Median Black Element</i>	<i>Average Black Element</i>	<i>Q</i>	<i>Range</i>
I. Best 25%	35	80%	76.5%	8.0	58—90
II. Middle 50%	69	80%	77.7%	5.5	60—90
III. Worst 25%	35	79%	78.9%	4.0	63—89

This time the averages give some evidence of white superiority, though again the differences between the groups are slight; the medians are practically equal.

The next table gives the number of points on the Point Scale obtained by the groups classified according to Pigmentation.

<i>Group</i>	<i>N</i>	<i>Median Score</i>	<i>Average Score</i>	<i>Q</i>	<i>Range</i>
I. Darkest 25%	36	293.5	288.1	47	154—421
II. Middle 50%	67	313.0	297.8	74.5	114—476
III. Lightest 25%	36	304.5	301.2	47.5	92—463

The averages show a slight improvement in intelligence scores in the case of the lighter Negroes; in the case of the medians, the best score is made by the intermediate group, but the light Negroes are again superior to the very dark ones. The range of the three groups shows that none of the very darkest Negroes made the best scores, but on the other hand the very poorest score was made by a member of the lightest group. The $\frac{D}{PE \text{ (diff)}}$ in the case of the medians of Group I and Group III is equal to 0.79, and the chances are 71 in 100 that there is a difference between these groups.

The correlations are as follows:

1. Between Intelligence and Black Pigmentation $r = -0.096$
2. Between Black Pigmentation and Age .. $r = 0.012$
3. Between Intelligence and Age $r = 0.54$
4. Between Intelligence and Black Pigmentation, with Age held constant $r = -0.12$

10. AN EXPLANATION OF THE RESULTS

It seems clear that on the whole, with rather minor exceptions, there is no definite evidence for any inverse relationship between Intelligence, as measured by these tests, and degree of Negro blood, as indicated by the measurements of certain Negroid physical traits. The question arises as to why these results should differ so markedly from those obtained by Ferguson,²² who demonstrated to the satisfaction of most of those who read his report that intelligence increased in direct proportion to the degree of white intermixture. The explanation would seem to be threefold. In the first place, the decision as to the degree of white blood was made from general observation in his case, and there is room for a considerably greater margin of error in his classification than in one based upon objectively verifiable measurements of traits known to be Negroid in character. In the second place, there was probably a marked social and economic differentiation between the lighter and the darker Negroes, in the case of large urban groups of the kind he tested, which may explain his findings. It is of course possible that economic differentiation is the result, and not the cause, of differences in "intelligence" as measured by the tests, but until this is proven, it must be regarded as a possible, if not a probable factor which enters into the results. In the case of the rural West Virginia Negro population from which the subjects in the present investigation were taken, this economic and social differentiation, though possibly present, was certainly not obvious, and could by no means have been as marked as that which obtains in certain larger Negro communities. Finally, the difference in the type of test used

²² See Reference (18).

is probably also a contributing factor. The results on Ferguson's linguistic material were undoubtedly affected more by these social and economic differences than the performance tests used in this study.

SUMMARY

1. During June and July, 1927, 12 tests in the Pintner-Paterson series were given to 139 Negro children and 25 White children between the ages of 7 and 16 years, living in a rural district in West Virginia.

2. The median I.Q. of the Negro group based on the Median Mental Age method, was 83 and of the White group, 88.

3. I. Q.'s computed separately for "time" and "accuracy" scores show a definite superiority for the Whites in the former, and a slight superiority for the Negroes in the latter.

4. The Speed Indices for the two groups show a greater speed of movement in the case of the White group. This does not conflict with the view that the environment and the size of the group are important factors in determining speed differences.

5. A comparison of West Virginia and New York City Negroes indicates a greater speed of movement in the case of the latter which is in all probability due to the difference in environment.

6. Measurements of certain Negroid traits,—Lip Thickness, Width of Nostrils, Pigmentation of Skin,—were taken in order to test the hypothesis that intelligence increases as the amount of Negro blood decreases. The results lend a little or no support to this hypothesis.

V THE INDIANS AT HASKELL

1. THE SUBJECTS AND THE TESTS

During August, 1927, the same twelve tests in the Pinter-Paterson series were given to a group of students at Haskell Institute, Lawrence, Kansas.

Haskell is perhaps the largest and most important Indian school in the country; it draws its students from many tribes and many states in the Middle West, the West, and the Southwest. The courses offered cover a wide range, from work in the early grades right up to that corresponding to the first or second year at college, and from commercial and mechanical to more purely academic studies. The students range in age from 7 years to the early twenties. On the whole they probably represent a fairly highly selected group from the educational, but not necessarily from the economic or social point of view, as tuition and living are free to a large proportion of students. In addition to the regular school work, the students do all the "domestic labor" around the school buildings, which keeps them occupied quite a few hours of every day. The instruction is evidently of a high order; this does not mean, however, that the Haskell group has had the same educational opportunities as a group of White children in a corresponding institution, nor does it make a direct comparison of Whites and Indians, especially by means of the usual linguistic tests, legitimate.

The group tested during the summer was regarded by the authorities at Haskell as being quite typical of the student body generally. If anything, those left at Haskell would probably be in a slightly inferior economic position to many of those who had gone because they were able to afford the journey to their homes in the summer, but no educational or "intellectual" difference was indicated. One hundred and thirty-six subjects, of both sexes, ranging in age from 7 to 21, were tested; of these only 32 were 14 years and under, so that on the whole the Haskell group studied may be regarded as a young adult group. The subjects ranged from full-blood to one-eighth Indian, and they came from a large area extending from Michigan to California, and from Montana to

Texas. Thirty-six tribes were represented, the largest groups being the Chippewa (25), Sioux (20), Winnebago (13), and Cherokee (10), and they came from nineteen states, of which the principal ones were Oklahoma (29), Montana (18), Minnesota (15), South Dakota (15), and Nebraska (13). The tests were administered to the boys in one of the classrooms, and to the girls in the Reading Room of the Girls' Building.²³

There were two questions, arising out of the results reported in the preceding sections, for which an answer was sought in this part of the investigation. The first related to the question of speed. Would the altered environment to which the Indians were subjected at Haskell have an effect on the slowness of movement which characterized the life on the Reservation, and which affected the results on the performance tests; or would the "racial" characteristic of slowness persist even in this altered environment? The second question was as to the relation between white mixture and intelligence. Is there any evidence, when performance tests are used, for "intelligence" scores to increase as the degree of white mixture increases? Are the results obtained by other investigators²⁴ corroborated by the results obtained when a different type of test, less subject to influences of training and environment, is used as a measure of intelligence?

2. THE SPEED OF THE HASKELL INDIANS

From the point of view under consideration here, no two environments could differ much more than do Haskell Institute and the Yakima Reservation. On the latter, time means nothing; there is no particular reason for getting a thing done today if tomorrow will do just as well; there is no premium on speed whatever. At Haskell, on the other hand, every day is full; life is active, busy, though by no means hectic. There are white teachers who believe it is good to get things done as quickly as possible. There are tasks which must be completed today, because tomorrow will bring other tasks, and because those in charge at Haskell expect them to be completed. There

²³ The writer wishes to express his thanks to Mr. Clyde M. Blair, Superintendent, for permission to work at Haskell, and to Mr. G. E. Peters, Principal, and to Miss Ruth Muskrat, Outing Matron, for their co-operation and courtesy during his stay at Haskell; also to Mrs. Brown for her kindness in securing the subjects for the tests.

²⁴ See References (43, 32).

is a full day's school work, and there are the daily chores, and the time-table calls for something to be done at almost every waking hour of every day. One of the teachers stated that when recently she wished to make an appointment for an extra hour with one of the girls, she had to wait three days before some free time could be found on the girl's schedule.

If the same racial group is subjected to two such widely differing environments, it becomes extremely interesting to see what differences in behavior emerge, for there is every reason to believe that such differences can be ascribed to the differing environment. There is, as is usual in all problems of this type, the factor of selection to be ruled out. There can hardly be any question of selection based *directly* upon innate or hereditary differences in speed. It is hardly probable that Haskell "selects" its students on that basis, or that the prospective student is influenced by that factor when he applies for admission. His application is determined rather by a complex of factors, which includes desire for and success in schooling, lack of opportunity for schooling near his home, the interest and initiative of the Indian Agent to whom he is known, the knowledge that training may be helpful in later life, etc; it is not likely that those children who move faster will therefore be keener about entering Haskell.

Indirectly, however, the speed factor may enter into the selective process. It may be an element in the previous educational success of the applicant, which will make him wish to continue with his studies. It may be part of that complex which leads him to enter the life of the White man, and to compete with him in industrial and professional activities, instead of contenting himself with the braids and blankets of his fathers, and following the path of lesser resistance on the Reservation. We shall therefore have to keep the factor of selection in mind as a possibility, although it probably exerts no important influence.

Speed Indices were calculated for the Mare and Foal test and the Healy "A" in the usual manner. The following table compares the results obtained by the students at Haskell with those obtained on the Yakima Reservation; the subjects included in both groups are at least three-fourths Indian, and at least 12 years old; it was pointed out in a preceding section that there is no change in Speed Index after the age of 12.

SPEED INDICES OF YAKIMA AND HASKELL INDIANS

	<i>Index of Speed Mare</i>			<i>Index of Speed Healy</i>		
	<i>N</i>	<i>Q</i>		<i>N</i>	<i>Q</i>	
Yakima	3.6	75	.6	4.3	71	1.5
Haskell	3.1	55	.8	2.3	55	.45

The range in each case is:

Yakima, Mare1.9—10.3
Haskell, Mare1.5— 6.7
Yakima, Healy1.7—17.1
Haskell, Healy1.3— 6.4

Both the ranges and the medians show a definite difference, the Haskell group in each case having lower Indices (which means that they move faster) than the Yakima group. As far as the medians are concerned, the $\frac{D}{PE \text{ (diff)}}$ is equal in the case of the Mare and Foal test to 3.65, which means that the chances are 99 in 100 that there is a true difference between the groups, while in the case of the Healy "A" Indices $\frac{D}{PE \text{ (diff)}}$ is equal to 9.6, which means not only that there is a perfectly reliable difference, but that the obtained difference is 140% "greater than it need be in order to insure a true Difference greater than zero."²⁵

3. RELATION OF SPEED TO DEGREE OF INDIAN BLOOD

As in the case of the Yakima group (see p. 37), the relation between degree of Indian blood and speed of movement was investigated, in order to throw some light upon the "racial" determination of speed. If speed is "racial," it ought to vary more or less proportionally to the degree of Indian blood; if environmental, it should be similar in all groups in the same environment, no matter what their racial constitution may be.

The following table shows median Speed Indices for four groups of Haskell Indians,²⁶ all the subjects being 12 years old or over.

²⁵ See Garrett (22).

²⁶ The degree of Indian blood was ascertained from the Haskell Institute records, which in turn received this information from the various Indian Agency offices.

SPEED INDICES AND DEGREE OF INDIAN BLOOD

<i>Group</i>	<i>Median Speed Index Mare and Foal</i>	<i>Median Speed Index Healy</i>	<i>N</i>
1. Full Blood	3.1	2.4	33
2. $\frac{3}{4}$ Indian or more	3.0	2.2	22
Average of 1 and 2	3.05	2.3	55
3. $\frac{1}{2}$ Indian or more	3.0	2.6	42
4. Less than $\frac{1}{2}$ Indian	2.7	2.3	27
Average of 3 and 4	2.85	2.45	69

In the case of the Mare and Foal Indices, there is some evidence for the racial factor in speed determination; the group with the least Indian blood is the quickest, and the group with the most Indian blood is slightly slower than the other two groups; Groups 1 and 2 combined (more Indian) are slower than Groups 3 and 4 combined (less Indian). In the case of the Healy "A" Indices, however, the situation is almost reversed. The slowest group is Group 2 ($\frac{3}{4}$ or more), while Groups 1 and 2 combined (more Indian) are faster than Groups 3 and 4 combined (less Indian). On the whole, therefore, the results are quite similar to those previously reported,—inconclusive, but not lending any definite support to the hypothesis of a true "racial" characteristic of speed.

4. SPEED AND PREVIOUS ENVIRONMENT

The Haskell group was now divided into two, on the basis of environment previous to coming to Haskell. Group 1 is a Reservation group, made up of students who have lived on a Reservation, where the population is exclusively Indian, or almost so; Group 2 is a non-Reservation group, made up of students who have lived in mixed communities, usually in small towns and villages, but occasionally in larger "white" cities. This division takes no account of degree of Indian blood; both groups contain all degrees, from one-eighth to full-blood Indian. Information as to previous environment was obtained directly from the students.

SPEED INDICES OF RESERVATION AND
NON-RESERVATION INDIANS

<i>Group</i>	<i>Median Speed Index Mare</i>	<i>Index Q</i>	<i>Median Speed Index Healy</i>	<i>Index Q</i>	<i>N</i>
1. Reservation	3.1	.7	2.5	.45	73
2. Non-Reservation	2.9	.7	2.2	.4	51

In the case of both tests, there is evidence that the non-Reservation group moved more quickly. In the case of the Mare and Foal median Indices, $\frac{D}{PE \text{ (diff)}}$ equals 1.25, and the chances are 80 in 100 that the time difference between the groups is greater than zero; in the case of Healy "A" $\frac{D}{PE \text{ (diff)}}$ equals 3.1, and the chances are 98 in 100 that there is a difference between the groups. While neither difference is completely reliable, it is clear that the results tend rather to support the hypothesis of an environmental determination of differences in speed.

On the other hand, some doubt is thrown upon this hypothesis when the Reservation group (Group 1 in the above table) is subdivided on the basis of length of stay at Haskell. All of these students have lived on a Reservation, and one might expect, on the environmental hypothesis, that their speed should increase (and their Speed Indices decrease therefore), as they stay longer at the Institute. The results follow:

SPEED INDICES AND LENGTH OF STAY AT HASKELL

Group	N	Median Speed Index	
		Mare	Healy
1. 4 years or more	12	3.4	2.4
2. 3 years.	13	3.1	2.3
3. 2 years.	19	3.1	2.3
4. 1 year or less	29	2.9	2.6

Group 4, the "1 year or less" group, is fastest in the Mare and Foal test, and slowest in the Healy "A" test; the evidence is conflicting, but does not quite fit the environmental theory. However, the subjects in Group 4, with one or two exceptions, had been at Haskell a full academic year, and they had had time to change. As one of the teachers remarked when this subject was being discussed, they change very quickly. The Haskell environment probably exerts quite an influence during the course of one year, and it is possible that by that time the subjects reach the speed level which they will later maintain.

The results obtained by the use of the Speed Index may be regarded as supporting, in the main, the hypothesis that speed of performance is dependent upon environment. There is a marked difference in speed between the Indians on the Yakima

Reservation and those at Haskell Institute, which can best be explained by the difference in environment, for although the two groups cannot be regarded as entirely homogeneous from the racial point of view, yet the differences are slight as compared to those between Indians and Whites. The factor of selection may enter into the speed of the Haskell group, but it is not probable that its effect is very great. Additional evidence for this hypothesis is found in the lack of correspondence between speed and degree of Indian blood, and also in the difference between those students who have, and those who have not, previously lived on a Reservation. Some argument against it can be found in the fact that there is no direct correspondence between speed and length of stay at Haskell.

5. "INTELLIGENCE" AND INDIAN BLOOD

In view of the results obtained by Hunter and Sommermier²⁷ and Garth,²⁷ which contain evidence, obtained by the use of the Otis Group Test and the National Intelligence Test respectively, to the effect that intelligence increases in direct proportion to the amount of white blood, it was felt that a similar analysis in the case of the Haskell group might be interesting. In the following results, the scores refer to the total number of points obtained on the twelve tests according to the Pintner-Paterson Point Scale. This method of comparison is preferable to that of the Median Mental Age and the

TOTAL SCORE AND DEGREE OF INDIAN BLOOD

<i>Group</i>	<i>N</i>	<i>Median Score</i>	<i>Q</i>	<i>Range</i>
1. Full Blood	32	441	30	371—503
2. $\frac{3}{4}$ Indian or more	18	470	42.5	367—518
3. $\frac{1}{2}$ Indian or more	34	434	25	204—503
4. Less than $\frac{1}{2}$	20	455	24	402—516
1 and 2.	50	448.5	33	367—518
3 and 4.	54	439.5	23	204—516
2, 3, and 4.	72	445.5	29	204—518

I.Q. in the case of subjects as old as these were. The table includes only those subjects who are at least 15 years old, so that for practical purposes they may all be regarded as young adults. The groups were divided on the basis of the records in the office of Haskell Institute.

²⁷ See References (43), (32).

It is clear at a glance that there is no correspondence between standing in the tests and degree of Indian blood. The best group is the " $\frac{3}{4}$ or more Indian," the poorest is the " $\frac{1}{2}$ or more" group, while the Full Bloods and the "less than $\frac{1}{2}$ " Indians are intermediate. All the Mixed Bloods taken together (Groups 2, 3, and 4) are slightly better than the Full Bloods, but the "more Indian" groups (1 and 2) are slightly better than the "less Indian" ones (3 and 4). It is safe to say that there is no argument here for white superiority.

6. THE I.Q.'S OF THE YOUNGER SUBJECTS

There were 32 subjects of 14 years of age or less, whose scores were not included in the results reported in the preceding table. For each of them a median mental age, and an I.Q. was computed. They also ranged from Full Blood to $\frac{1}{8}$ Indian; the age range was from 7 to 14. The group was divided into 3 groups on the basis of degree of Indian blood, but the cases are too few for the results so divided to be of much significance.

The results follow:

I. Q. AND INDIAN BLOOD—YOUNGER SUBJECTS

Group	N	Median ²³		Av.
		I. Q.	Range	
1. $\frac{3}{4}$ Indian or more	10	92.5	69—138	94.3
2. $\frac{1}{2}$ Indian or more	13	100	59—120	95.6
3. Less than $\frac{1}{2}$	9	100	50—109	93.6
Whole group	32	100	50—138	94.7

In this case, the "most Indian" group has a median I.Q. which is 7.5 points below that of the other two groups, but the other two groups are equal. As far as averages are concerned, there is little to choose between the three groups. The highest I.Q. (138) was obtained by a $\frac{3}{4}$ Arapaho boy aged 10, and the next highest (122) by a full-blood Potawatomi girl, aged 9, while the lowest I.Q. (50) was obtained by a $\frac{1}{4}$ Indian boy of 14 (Cherokee and Choctaw). The cases are very few, but what evidence there is should perhaps be regarded as slightly, but quite inconclusively, in favor of the hypothesis of white superiority. It was unfortunate that so few of the younger children were available for testing purposes.

²³ By the Median Mental Age method. The I.Q.'s would probably be considerably higher by the Year Scale method. See page 60.

Perhaps the most interesting finding is that the median I.Q. for the whole group is exactly 100. The uncertain character of the factor of selection which is operative here makes any conclusions as to "racial" intelligence extremely dubious; it is safe to say, however, that any linguistic test would have demonstrated an apparent inferiority in this group which is not substantiated when performance tests are used. We now have the right to say that this particular Indian group has a median "intelligence" equal to that of the "normal" white group; the more usual type of test,—the Binet-Simon, or one of the group tests,—would have placed these children at a great disadvantage and would have led to the belief in an inferiority on the part of the Indians which in all probability does not exist.

On the basis of the results reported in the last two sections, we are warranted in concluding that the relative standing of the various groups of Mixed and Full Bloods at Haskell does not lend any support to the hypothesis of white superiority, and of a gradual improvement in "intelligence" as the proportion of Indian blood decreases.

The exact significance of these results, as in the case of the Negroes (see p. 55) depends also upon the assumption that the white stock which has mixed with the Indian is "normal" or average. This assumption cannot be safely made, however; it is practically impossible to ascertain just what kind of stock did enter. The probability is that it was very near the average,—but this will have to remain merely a probability. The preceding results may perhaps best be regarded, therefore, as in the nature of a rejoinder to those who have used this type of argument to support their contention of white superiority. Their significance is negative rather than positive. Without justifying the conclusion that the full-blood Indian is equal to the White, they do justify the statement that the argument for white superiority which has been based upon a comparison of mixed- and full-blood Indians seems to fall down when applied to this particular group, when performance tests, rather than linguistic ones, are used. They throw doubt upon the assumption of white superiority in so far as it depends upon this type of argument, even though they do not justify, by themselves and without further evidence, the opposite conclusion.

SUMMARY

1. Twelve tests in the Pinter-Paterson series were given to 136 students at Haskell Institute, Lawrence, Kansas, during August, 1927.

2. The performance of this group is much quicker, and the Speed Indices lower, than in the case of the Yakima Indians previously reported. This indicates that differences in speed are in all probability due to environmental differences, and not to race.

3. There is no definite tendency for speed of performance to increase as the degree of Indian blood decreases.

4. The group which has lived on a Reservation previous to coming to Haskell shows a tendency to be slower than the group which has never lived on a Reservation.

5. There is, however, no demonstrable correspondence between speed of performance and length of stay at Haskell.

6. In the case of the older group (15 years and over) there is no tendency for "general intelligence" scores, as based on the Performance Test Point Scale, to *increase* as the proportion of Indian blood decreases.

7. In the case of the younger subjects, there is some evidence for improvement in median I.Q. as the proportion of Indian blood decreases, but the evidence is slight, and does not hold in the case of the averages, or the upper and lower limits of excellence. On the whole, these results cannot be said to lend much weight to the doctrine of white superiority.

VI. A LEARNING TEST

1. "INTELLIGENCE" AS THE ABILITY TO LEARN

Several writers²⁹ have defined "intelligence" as the ability to learn, or to profit by experience. This aspect of intelligence has not often received attention from those who have investigated racial differences. It seems indisputable, however, that the ability to learn is at least as important a factor in "general intelligence" as the ability to adapt successfully to a new situation, which is the factor more frequently studied. If general intelligence can be said to consist of these two factors (obviously they need not be the only two) the possibility arises that two groups may differ qualitatively in this regard also, so that one may handle new situations more effectively, while the other profits more by previous experience. Under such conditions, a test which stressed one or the other of these factors exclusively might properly be regarded as unfair to one group, at least until it was determined which of the two were more important.

An attempt to determine the relative importance of these two factors was made by Johnson.³⁰ His method was to set 60 university students the task of learning to read inverted print in a mirror. The task was continued twenty days. The students were given several group intelligence tests, including the Army Alpha, the Thurstone Examination, the Haggerty Reading test, the Van Wagenen Association A test, and Johnson's Geometrical Figures test. The average score made on these was taken as the subject's intelligence score. The correlation between this score and the average number of words read per day was $.34 \pm .08$. The correlation between this intelligence score and *improvement* in ability to read, as measured by the difference between the average number read during the first three days and the last three days was $.46 \pm .07$. The author concludes that not the absolute amount read, but the amount of improvement, is most important. Rapidity of learning—acquiring new connections—is most closely related to mental ability.

²⁹ For example, Colvin (11).

³⁰ See Reference (45).

Peterson's use of the Rational Learning test is one of the few attempts to introduce the problem of learning into the study of racial differences. In an investigation referred to above,³¹ Peterson gave this test to 69 White and 46 Negro children at Nashville, Tennessee, all 12 years old. He found that the Whites excelled markedly and reliably on the basis of *time* $\left(\frac{D}{PE \text{ (diff)}} = 5.0\right)$ and considerably on the basis of *errors* $\left(\frac{D}{PE \text{ (diff)}} = 3.0\right)$ but there was practically no difference (50% overlapping) in the number of *repetitions* required.

Baldwin³² used a substitution test as a measure of learning in a study made at Sleighton Farm, which is the girls' division of the Pennsylvania Reformatory School. The subjects were 37 White and 30 Negro girls, between the ages of 13 and 21. The task was in the nature of a substitution test, the girls having to learn to put certain symbols in the place of corresponding letters. Baldwin found the Negro girls decidedly inferior, and concluded that "the learning capacity of delinquent Negro girls differs quantitatively and qualitatively from that of the White girls." It must be remembered, of course, that delinquent girls may not be fit subjects from which to draw conclusions regarding racial differences, and also, as Baldwin points out, that the Negro girls in this study showed little interest in the test, and were "suspicious as to the value of the task." This difference in attitude, rather than in learning capacity, might account, in part at least, for the results.

Pyle³³ studied the learning capacity of 130 Negro children with a learning apparatus, in which the task was to build up a set of motor associations and coordinations. He concludes that Negro children have $\frac{3}{4}$ to $\frac{4}{5}$ the learning capacity of White children. As his report does not include the detailed results, nor an adequate account of the method, no analysis of the significance of these results is possible.

2. HEALY "A" AS A LEARNING TEST

In order to investigate the ability of various groups to *learn*, the writer gave the Healy "A" test twice to every subject in the New York White, New York Negro, and West Virginia

³¹ See Reference (57).

³² See Reference (4).

³³ See Reference (68).

Negro groups, who completed the test successfully within five minutes the first time. The procedure was to ask the subject to look away immediately after the test was solved the first time; the pieces were then placed in the same position as before, and the subject asked to put them together again. No time was lost between the two trials, as it was felt that an intervening period would be "filled" differently in the case of different individuals, and that unknown additional factors might possibly enter as a result. If a subject failed on his first trial, he was not given the test a second time, again because it was felt that showing the subject how to do the test would introduce complicating factors which might affect the results in an uncertain manner.

The results which follow were obtained with the three groups mentioned above—the New York White and the New York Negro (i.e., those living in New York; not merely those born there) and those West Virginia Negroes who were between the ages of 11 and 16 years. This gave three groups who were quite homogeneous as to age, the range of all three being 11 to 16 years, the median age of all three 13 years, the average age 13.14, 13.39, and 13.18 years respectively, and the Q 1, 1½ and 1 year respectively.

The following table gives the results for time:

TABLE OF GAINS—WHITES AND NEGROES

<i>Group</i>	<i>Time Median 1st Trial</i>	<i>Time Median 2nd Trial</i>	<i>Gross Gain</i>	<i>% Gain</i>	<i>Q 1st Trial</i>	<i>Q 2nd Trial</i>	<i>N</i>
N. Y. White	54 sec	11 sec	43 sec	79.6%	40.5	7 sec	93
N. Y. Negro	77 sec	13 sec	64 sec	83.1	70.5	10 sec	132
W. Va. Negro	61 sec	12 sec	49 sec	80.3	41	5.5 sec	73

Several things seem worthy of comment in connection with these results.

1. The three medians in the second trial are practically identical, in spite of the fact that the first trial showed a fairly marked superiority of the Whites over both groups of Negroes.

2. The gross gains are in each case definitely greater in the case of the Negro groups than in the case of the White group.

3. The relative gains, i.e., the per cent which the gross gain is of the first median, also favor the Negro groups, but not

very markedly. This measure is undoubtedly a better one than the gross gain, for the reason that it is easier to make a larger gross gain when one starts with a poorer score.

4. Even this measure is open to question, however, because of the possibility that the factor of the "physiological limit" may enter here. It has been pointed out by Stoddard³⁴ that if a sprinter who formerly did 100 yards in 14 seconds reduces his time to 11 seconds, while another who formerly did 12 seconds reduces his time to 10, it cannot therefore be said that the difference between the two sprinters has decreased. It is true that both the gross and the relative per cent gain of the former is greater, yet the reduction effected by the latter may still be the greater achievement, because of the proximity of the physiological limit. In the case of the results reported here, this factor may enter, but probably not to a very great extent, as the practical lower limit for the Healy "A" test is about 5 seconds; there is still much room for improvement in the test scores. It seems reasonable to say, therefore, that the improvement made by the Negroes (or their ability to profit by experience as measured by these results) is at least as great as, and probably greater than, that made by the Whites.

The next table gives the result for *moves*.

TABLE OF GAINS—WHITES AND NEGROES

<i>Group</i>	<i>Moves Median 1st Trial</i>	<i>Moves Median 2nd Trial</i>	<i>Gross Gain</i>	<i>% Gain</i>	<i>Q 1st Trial</i>	<i>Q 2nd Trial</i>
N. Y. White	22	7	15	68.2	16	5
N. Y. Negro	26	8	18	69.2	19	4.5
W. Va. Negro	21	6	15	71.4	10	5.5

In general, it can be said again that there is apparently little difference in learning ability as shown by these results, but that whatever slight advantage there is favors the Negroes. The gross gain in moves is greater in the case of the New York Negroes than with either of the other two groups, while the relative gain is greater in the case of the West Virginia Negro group than in the case of the White group.

As far as moves are concerned, we have a rather more satisfactory method of dealing with the "physiological limit."

³⁴ See Reference (72).

Here there is a definite limit, namely five moves, which is the minimum number required to complete the test. One measure of profiting from experience, then, would be the proportion of subjects from each group who had "learned" enough from their experience in the first trial, to reach the "physiological limit," or the minimum number of moves, in the second trial. This gives the following results:

<i>Group</i>	<i>N</i>	<i>Number Completing Test in 5 Moves</i>	<i>% Completing Test in 5 Moves</i>
N. Y. White	93	28	30.1%
N. Y. Negro	132	41	31.1%
W. Va. Negro	73	28	38.4%

This measure shows a fairly definite superiority on the part of the West Virginia Negro group; the other two groups are approximately equal.

There is one more measure which we can use as an index of the ability of a group to learn, namely, the proportion of subjects in a group who improve their score in the second trial as compared with the first. The results follow:

<i>Group</i>	<i>N</i>	<i>Number of Subjects Improving Time Score</i>	<i>%</i>	<i>Number Subjects Improving Moves Score</i>	<i>%</i>
N. Y. White	93	84	90.3	80	86.0
N. Y. Negro	132	118	89.4	116	87.9
W. Va. Negro	73	65	89.0	63	86.3

In this table, the proportions for each of the three groups are almost identical; there is no indication of superiority of any one group over either of the others.

In general, two conclusions appear to be indicated by these data:

1. That these groups differ only slightly in "ability to learn," but that what difference there is seems to favor the Negroes; 2. That very slight practice with Healy "A" tends to remove whatever differences there exist in the results of the various groups.

If generalizations were possible on the basis of these data, their implications would be extremely significant. It could be said, for example, that while Negroes may at the present time be inferior to the Whites in performance, their potentialities

are as great, and that education will iron out the differences between them. Such a conclusion may be (and probably is) valid, but it cannot be based on the meager data presented here. These can hardly be regarded as more than suggestive of a possible line of approach in the study of racial differences in intelligence.

3. WOODWORTH'S RESULTS

In the course of the pioneer work in racial testing at the St. Louis Fair in 1904, Woodworth and Bruner made use of a simple Form Board, and gave three successive trials to each subject.³⁵ The Form Board contained nine holes, into each of which fitted a figure of geometrical form. The test consisted in having the subject pick up the blocks from a pile, placing each in the appropriate opening in the board. A record was kept of the time and of the number of errors, i.e., the number of misplacements made in connection with the blocks before their proper holes were discovered. The subjects whose records are used here were all adult males, from the age of 19 years upwards.

Group	N	TIME								
		Trial 1	%	Rank	Trial 2	%	Rank	Trial 3	%	Rank
White	74	31.0	100	1	28.0	100	4	24.4	100	3
Vancouver I	5	32.0	97	2	26.1	107	2	28.0	87	7
Indians ³⁶	18	32.3	96	3	26.3	106	3	22.8	107	2
Singhalese	11	36.3	85	4	28.2	99	5	27.7	88	6
Filipino	500	36.4	85	5	30.3	92	6	26.9	91	5
Eskimo	10	37.1	84	6	33.6	83	7	25.6	95	4
Patagonian	2	38.5	81	7	41.0	68	9	31.5	77	8
Ainu	4	41.6	74	8	25.8	108	1	20.4	120	1
Bagobo	14	44.8	69	9	41.5	67	10	41.1	60	10
Moro	40	46.5	67	10	44.0	64	12	41.9	58	11
Cocopa	6	48.0	64	11	45.4	62	13	44.8	54	13
Pueblo	10	51.5	60	12	35.8	78	8	45.6	54	14
Tinguanes	9	53.2	58	13	48.0	60	14	39.7	61	9
Igorot	12	56.1	55	14	43.3	65	11	44.4	55	12
Negrito	12	71.9	43	15	61.4	46	15	56.6	43	15
African Pigmy	7	94.8	33	16	86.9	32	16	64.9	38	16

The following table contains the results for the three trials as regards *time*. After each trial, the times are assigned a percentile value, using the score of the Whites as the standard, 100%.

³⁵ Prof. Woodworth has kindly placed his original data at my disposal. He is not responsible for the conclusions which have here been drawn from his material.

³⁶ These are Indians attending the Government Schools.

Whereas the Whites lead in the first trial, with the Vancouver Indians and the Government School Indians as close seconds, they are surpassed in the second trial by both of these groups and the Ainu, with the Singhalese and the Filipinos almost equal with them, while in the third trial they are surpassed by the School Indians and the Ainu, with the Eskimo and Filipino groups close behind. There is evidence, therefore, for a greater learning ability on the part of certain other groups as compared with the Whites.

The results for *errors* show a similar tendency.

<i>Group</i>	<i>Trial 1</i>	<i>%</i>	<i>Rank</i>	<i>Trial 2</i>	<i>%</i>	<i>Rank</i>	<i>Trial 3</i>	<i>%</i>	<i>Rank</i>
Indians	1.6	113	1.5	1.4	114	3	0.9	155	2
Eskimo	1.6	113	1.5	2.4	67	10.5	1.4	100	5.5
White	1.8	100	3	1.6	100	6.5	1.4	100	5.5
Moro	1.9	95	4	1.5	107	4.5	1.7	82	7.5
Filipino	2.0	90	5	1.9	84	8	1.7	82	7.5
Singhalese	2.1	86	6.5	1.6	100	6.5	1.2	117	4
Bagobo	2.1	86	6.5	2.4	67	10.5	2.0	70	9.5
Vancouver I.	2.6	69	8	1.2	133	1.5	2.0	70	9.5
Tinguianes	3.0	60	10	2.7	59	13	2.2	64	11
Cocopa	3.0	60	10	2.0	80	9	2.5	56	12
Ainu	3.0	60	10	1.2	133	1.5	0.5	280	1
Patagonian	3.5	51	12.5	1.5	107	4.5	1.0	140	3
Igorot	3.5	51	12.5	2.6	62	12	2.7	52	13
Pueblo	3.6	50	14	3.0	53	14	2.8	50	14
Negrito	4.0	45	15	4.0	40	15	4.5	36	15
African Pigmy	5.0	36	16	6.0	27	16	5.0	28	16

In the scores for errors, the Whites are even exceeded in the first trial by the School Indians and the Eskimos; it is interesting to note that the difference between these two Indian groups and the Whites is somewhat similar qualitatively to that which the writer noted between the Yakima Indians and the Whites, namely a superiority for the Whites in time scores and a superiority for the Indians in scores for accuracy. In the second trial, the Whites are surpassed by the Vancouver Indians, the Ainu, the School Indians, the Moros, and the Patagonians, and equalled by the Singhalese; while in the third trial, they are surpassed by the Ainu, the School Indians, the Patagonians, and the Singhalese, and equalled by the Eskimos. Of the four groups which surpass the Whites on the third trial, three of them (*viz.*, all excepting the School Indians) were inferior to the Whites on the first trial, while the fourth, the School Indians, has increased its lead over the Whites; it is fair to say, therefore, that at least these four

groups have shown, in this test, greater learning ability than the Whites. Of the four groups, two of them contain too few cases for the results to be significant, but the remaining two, the School Indians and the Singhalese, are of substantial size.

In spite of the difficulty in interpreting the significance of gross gains and relative gains in this type of material, the results are presented for what they are worth. The first table gives the results for time; the second for errors.

TIME

Group	Gross Gain		Rank in % Gain	Gross Gain		Rank in % Gain
	2nd Trial Over 1st	% Gain		3rd Trial Over 1st	% Gain	
Ainu	15.8	38.0	1	21.2	50.9	1
Pueblo	15.7	30.5	2	5.9	11.4	13
Igorot	12.8	22.8	3	11.7	20.8	9
Singhalese	8.1	22.3	4	8.6	23.4	7
Indians (School)	6.0	18.9	5	9.5	29.4	4
Vancouver I.	5.9	18.4	6	4.0	12.5	12
Filipino	6.3	16.5	7	9.5	26.1	5
Negrito	10.5	14.6	8	15.3	21.3	8
Tinguianes	5.2	9.8	9	13.5	25.4	6
Whites	3.0	9.7	10	5.6	18.1	11
Eskimo	3.5	9.4	11	11.5	31.5	3
African Pigmy	7.9	8.3	12	29.9	31.5	2
Bagobo	3.3	7.4	13	3.7	8.3	15
Cocopa	2.6	5.4	14.5	3.2	6.7	16
Moro	2.5	5.4	14.5	4.6	9.8	14
Patagonians	-2.5*	-6.5	16	7.0	18.2	10

*The minus sign means a loss

ERRORS

Group	Gross Gain		Rank in % Gain	Gross Gain		Rank in % Gain	4 Ranks Com- bined
	2nd Trial Over 1st	% Gain		3rd Trial Over 1st	% Gain		
Ainu	1.8	60.0	1	2.5	83.3	1	1
Patagonians	2.0	57.1	2	2.5	71.4	2	6
Vancouver I.	1.4	53.8	3	0.6	23.1	6	5
Cocopa	1.0	33.3	4	0.5	16.7	10	13
Igorot	0.9	25.7	5	0.8	22.9	7	4
Singhalese	0.5	23.8	6	0.9	42.9	4	2.5
Moro	0.4	21.1	7	0.2	10.5	13	15
Pueblo	0.6	16.7	8	0.8	22.2	8.5	8
Indians (School)	0.2	12.5	9	0.7	43.8	3	2.5
White	0.2	11.1	10	0.4	22.2	8.5	10
Tinguianes	0.3	10.0	11	0.8	26.7	5	7
Filipino	0.1	5.0	12	0.3	15.0	11	9
Negrito	0.0	0.0	13	-0.5	-12.5	16	14
Bagobo	-0.3	-14.3	14	0.1	4.8	14	16
African Pigmy	-1.0	-20.0	15	0.0	0.0	15	12
Eskimo	-0.8	-50.0	16	0.2	12.5	12	11

If we combine (last column), the four "ranks" given to each group on the basis of per cent gained (2 ranks for time, and 2 ranks for errors), we find that the Ainu profited most by their previous experience and the Bagobos least; that the Singhalese, the School Indians, the Igorots, and the Vancouver Indians, profited a great deal, relatively; and that the Moros, the Negritos, the Cocopas, and the African Pigmies profited relatively little. The remaining groups, including the Whites, occupy an intermediate position.

The significance of the results reported in this section lies in their suggestion that even if the Whites are superior in the initial performance of a test, the fact that this superiority is not maintained through later trials may indicate that other groups surpass the Whites in learning capacity. Since learning capacity is an important factor in "general intelligence" (just how important remains to be determined), these results suggest the possibility of a qualitative difference between the intelligence of various groups, such that one group may excel in the ability to deal successfully with new situations, while the other may excel in the ability to profit by experience. At the present writing, however, the evidence is by no means definite enough to warrant such a conclusion.

Part of the explanation of these results may lie in the fact that the initial performance of the Whites is superior because of greater familiarity with the test situation or with problems of a similar character, and that this superiority disappears when the other groups have had some experience with the test and the kind of activity it involves.

SUMMARY

1. The ability to profit by experience is an important aspect of "general intelligence," and deserves attention in the investigation of racial differences.

2. The Healy Puzzle "A" was given twice to the New York White, the New York Negro, and the West Virginia Negro groups, with a view to investigating the learning ability of these groups.

3. The results show a distinct superiority in gross gains, and a very slight superiority in relative gains, on the part of the Negro groups.

4. On the whole, the tentative conclusion may be drawn that as far as the results on this test can be accepted, there is little difference between Negroes and Whites in the ability to profit by experience.

5. Analysis of results obtained at St. Louis by Woodworth in 1904 indicate that whereas the White group shows some superiority in the first trial with a Form Board, it is surpassed by several other groups in subsequent trials.

6. There is evidence, in Woodworth's material, for a learning ability in several groups greater than that possessed by the Whites who were tested on this occasion.

7. The suggestion is made that this may offer a basis for further work in the investigation of qualitative differences between groups.

VII. THE PROBLEM OF SPEED

1. DIFFERENCES IN SPEED

The following table summarizes the findings for speed in the case of all the groups tested. The Speed Indices are based upon the results obtained with subjects 12 years old or more, so that the age difference between the various groups (which is slight, with the exception of the older Haskell group) may safely be disregarded.

MEDIAN SPEED INDICES OF ALL GROUPS

<i>Group</i>	<i>Index of Speed Mare</i>	<i>N</i>	<i>Q</i>	<i>Index of Speed Healy</i>	<i>N</i>	<i>Q</i>	<i>Av. Mare and Healy</i>
I Yakima I.	3.6	75	.6	4.3	71	1.5	3.95
II W. Va. N.	3.6	73	.75	2.95	72	.6	3.28
III W. Va. W.	3.4	11	1.4	2.5	11	.65	2.95
IV Toppenish W.	2.9	50	.55	2.8	46	.7	2.85
V New York N.	2.9	50	.55	2.6	50	.55	2.75
VI Haskell I.	3.1	55	.8	2.3	55	.45	2.7
VII New York W.	2.9	88	.6	2.3	88	.4	2.6
I and VI Indians	3.35	130		3.31	126		3.33
II and V Negro	3.25	123		2.78	122		3.02
III, IV and VII White	3.07	149		2.53	145		2.8
I, II and III Rural	3.53	159		3.25	154		3.39
V, VI and VII Urban	2.97	193		2.4	193		2.69

(In this table, the Yakima and the Haskell Indian groups include only those subjects who are three-quarters Indian or more. As there were proportionately fewer Full Bloods in the Haskell group, this might account for the difference in Speed Indices if a racial factor were operative; however, if only the Full Bloods at Haskell are used, the median Speed Indices remain practically unchanged. For the Full Bloods, the median Speed Index for the Mare and Foal test is 3.1; for the Healy "A" test 2.4 (instead of 2.3); and the average of the two is 2.75 (instead of 2.7). N=33.

The inclusion of the Haskell Indians among the "urban" groups calls for a word of explanation. Haskell Institute is not "urban" in the usual sense, but it is perhaps the most ur-

ban environment in which any considerable group of Indians can be found. Certainly the environment is very different from that of the Reservation, and the close proximity of the city of Lawrence, Kansas, lends added justification to its characterization as "urban." In any case, if the environmental explanation of the factor of speed holds good, we would expect a more urban group to be even faster than a less urban or doubtfully urban group; there should therefore be little objection to describing it as urban for the purposes of this comparison.

The Toppenish Whites were not included in either the urban or the rural group, because it was difficult to know just how to classify them. Toppenish is a flourishing town of about 8,000 inhabitants, which is certainly not rural, but also not quite a city. Interestingly enough, it is just mid-way in the rank order of the seven groups for speed.

The New York Negro group includes only those subjects born in New York City.)

These results seem to show both a racial and an environmental influence. If we look at the averages in the last column, we see that the three rural groups are indeed the slowest, but that of these the Yakima Indians are the slowest of all, with the West Virginia Negroes second, and the small group of West Virginia Whites next; we see also that the three "urban" groups are the fastest but again the Whites are fastest of all, with the Haskell Indians and the New York Negroes about equally far behind them. The Indian groups taken together are the slowest, the Whites fastest, and the Negroes intermediate. The three rural groups taken together are definitely slower than the three urban groups. Apparently both "race" and "environment" exert an influence.

It should be noted, however, that the difference between the rural and urban groups, on the average, is greater than that between any two races. This would at least justify the presumption that environment was more important. The results go a considerable way, however, towards justifying the further presumption that the environment is solely responsible or at least that we can be reasonably certain of the effect of environment, while that of race must remain doubtful.

If race is responsible, a number of additional hypotheses are needed in order to explain the results as here reported. There

is first the difference between the Yakima and the Haskell Indians; it may be that a factor of selection has been operative here, and we must bear its possibility in mind; it may be further that there is a biological difference between the Indians of the West coast and the variety of Plains, Southwestern, and other tribes represented at Haskell, but such a difference can only be very slight at most, and need hardly be taken very seriously in a study which deals with broad racial groupings. As for the possibility that the Haskell group contained relatively more white blood, that factor has been controlled by testing the effect of using only the Full Bloods at Haskell.

The difference between the West Virginia and the New York Negroes can perhaps be explained, apart from the environmental hypothesis, by a factor of selection operating to draw the faster Negroes to New York, and in addition by the presence of a greater proportion of white blood in the New York group. It is quite possible that there is a racial difference of this kind between the two groups. A comparison of the physical measurements obtained in West Virginia with those obtained in Harlem by Herskovits indicate that the West Virginia group had slightly thicker lips and wider noses at most ages, and were on the whole somewhat darker. (The "personal equation" of the investigator must not be ignored, however; Herskovits states that King consistently saw skin color darker than he did). Whether this difference is sufficient to account for the fairly marked differences in speed,—as marked as those obtaining between West Virginia and New York Whites,—is extremely doubtful, but it must be considered as a possibility.

There is a specific argument against the factor of selection in the results obtained from a comparison between Negroes born in New York, and those who have lived less than a year in New York, the latter showing a slower rate of performance in spite of the fact that they must also have been "selected." Of course it is still possible that the selective factors operating today are not the same as those operating, say, twenty to thirty years ago. For one thing, the selection may not be quite as rigorous, and we may therefore be getting less enterprising and adventurous, and, as a possible consequence, slower Negroes. In the meantime, there is no definite evidence for this hypothesis, so we may perhaps dismiss it with

this mention. Slightly more serious is the possibility that the group born in New York may be less Negro than the more recent arrivals. A classification of the various Negro groups in New York on the basis of color (as judged by inspection) indicates that this may be so.

NEW YORK NEGRO GROUPS CLASSIFIED ACCORDING TO COLOR

Group	Darkest		Lighter		Still Lighter		Lightest		Total No.
	No.	%	No.	%	No.	%	No.	%	
I. Less than 1 yr. in N. Y.	12	46.2	8	30.8	4	15.4	2	7.7	26
II. 1—5 yrs. in N. Y.	37	54.4	22	32.3	6	8.8	3	4.4	68
III. More than 5 yrs. in N.Y.	24	50.0	11	22.9	9	18.7	4	8.5	48
IV. Born in N. Y.	16	27.6	16	27.6	14	24.2	12	20.7	58

There are differences here which may account for the fact that the group born in New York is faster than those who have arrived within the year. However, Group I was also slower than Groups II or III, and there is no difference in the racial constitution of these other groups to account for the result.

To test the possibility that the quicker speed of the subjects born in New York City was due to the greater proportion of white blood, the group was subdivided on the basis of color.

SPEED INDICES OF NEW YORK BORN NEGROES ACCORDING TO COLOR

Group	Median S. I.		Av.	Median S. I.		Av.	Av. of Medians	N
	Mare and Foal			Healy A				
I. Darkest	3.2	3.19	3.2	3.26	3.2	16		
II. Lighter	3.5	3.6	2.3	2.47	2.9	16		
III. Still Lighter	2.6	2.74	2.4	2.31	2.5	14		
IV. Lightest	2.7	2.87	2.8	2.96	2.75	12		

There is some evidence here of a racial basis for speed, although again it is not quite consistent. The progression is by no means regular, the quickest group in the Mare and Foal test being one of the lighter groups, while the quickest group in the Healy "A" is one of the darker ones. On the whole, however, these data do suggest the possibility of a racial factor.

A similar analysis of the data obtained on the Yakima Reservation and at Haskell Institute, as described earlier in

this report, yields inconclusive results. In neither case is there a regular increase of speed with increase of white blood. Among the Yakimas, the Full Bloods, the " $\frac{3}{4}$ Indian" and the " $\frac{1}{2}$ Indian" all have approximately the same Speed Indices; it is only the "less than $\frac{1}{2}$ Indian" (10 cases) who are somewhat faster. At Haskell, the "less than $\frac{1}{2}$ Indian" group are the fastest again, but the Full Bloods, and the " $\frac{3}{4}$ Indian" subjects are faster than the " $\frac{1}{2}$ Indian"; the differences between all of these groups are very small. On the "racial hypothesis" it is difficult to see why those subjects who had lived on the Reservation should be slower than those who had not lived on a Reservation; but on the "environmental hypothesis" we should expect those who had been longer at Haskell to be faster than those who had come within a year—and they are not. (See p. 77.)

On the whole, it would perhaps be safest to say that the results yielded by an analysis of data obtained within each of the various groups are not quite conclusive, and that they cannot be regarded as completely demonstrating either a racial or an environmental factor. Either interpretation seems to account for some of the results, and neither for all of the results. When we come, however, to the comparison of the various groups with each other, as summarized in the table with which this section begins, it would seem that the environmental hypothesis undoubtedly accounts for more of the facts, and is therefore to be preferred. It is the more probable explanation of the difference between the Yakima and the Haskell Indians, between the West Virginia and the New York Negroes and between the West Virginia and the New York Whites. There is no reason for assuming a difference in racial constitution (except to some slight extent in the case of the Negroes) in order to account for the results; the difference in environment and "culture" can do so adequately. It is a difference in environment which can best account for the large difference between groupings along "rural" and "urban" lines irrespective of race.

The case is different when we consider the groupings along "racial" lines irrespective of environment. There seems at first sight to be a real difficulty here for the environmental hypothesis, but the difficulty really disappears when we remember that within the "urban" and within the "rural" groups,

there is still a difference in the environments of the various races. It was pointed out previously that the environment of a Negro group in a Southern village or town differs markedly from that of the White group in the same town; that Harlem is not quite like the rest of New York; and that life on an Indian Reservation is very different, socially, culturally, and industrially, from that of any Negro or White community, no matter how rural. There are still sufficiently well-marked environmental differences to account for the results, altogether apart from race; no "racial factor" is needed as an additional hypothesis. Nor is it possible to explain all these results in terms of race, rather than environment, without bringing in at every turn factors of selection, or of biological differences within the same race,—factors which may be operative, but for which there is at present little or no evidence. On the whole, since it is a question here of probabilities rather than of strict proof, the conclusion seems to be justified that environmental factors can explain all of the observed differences in speed.

The writer confesses to a preference for the environmental hypothesis on logical, or better methodological grounds. If the evidence were such that the facts could just as easily be explained by one hypothesis as the other, he would incline to regard that as a presumption in favor of environmental factors. For to explain observed differences on the basis of race and heredity does not seem to him to clarify the problem. Environmental factors,—custom, culture, tradition, education, contact and relationship with other peoples,—are much more tangible and definite than the factor of race, psychologically speaking. Other things being equal, therefore, an environmental explanation is to be preferred. Only when that fails should the racial factor be invoked,—and in the present instance there seems to be no such necessity.

There are many who prefer not to regard this problem as one of race *or* environment, but who believe that both are operative, and that the real problem is to determine their respective quantitative influence. From that standpoint, the results of this investigation should be regarded as supporting the view that environment is relatively much more important. When the difference in the environments of the various racial groups was decreased, the difference in their behavior was

greatly decreased also. The proper program for further investigation would therefore be to reduce the environmental differences still further, if possible, and see whether a "racial" difference persists. As long as the environments differ, any conclusion as to the influence of race must remain doubtful.

2. THE SPEED FACTOR IN WOODWORTH'S RESULTS

Speed Indices were also calculated for the various groups used by Woodworth at St. Louis, by dividing the number of moves into the total time required to complete the test. Woodworth's records include errors, and not moves, but as the Form Board required a minimum of 9 moves, each one of them distinct and independent (as in the case of the Mare and Foal test), a Speed Index was obtained by adding 9 to the number of errors, and then dividing into the time. The records, arranged in order of decreasing speed, are as follows. (Only the results on the first trial are included.)

MEDIAN SPEED INDICES OF WOODWORTH'S GROUPS

<i>Group</i>	<i>Time</i>	<i>Rank</i>	<i>Moves</i>	<i>Rank</i>	<i>Speed Index</i>	<i>Rank</i>	<i>N</i>
Vancouver I.	32.0 sec.	2	11.6	8	2.8	1	5
Whites	31.0	1	10.8	3	2.9	2	74
Indians	32.3	3	10.6	1.5	3.0	3	18
Patagonians	38.5	7	12.5	12	3.1	4	2
Singhalese	36.3	4	11.1	6	3.3	5.5	11
Filipino	36.4	5	11.0	5	3.3	5.5	500
Eskimo	37.1	6	10.6	1.5	3.5	7.5	10
Ainu	41.6	8	12.0	11	3.5	7.5	4
Cocopa	48.0	11	12.0	10	4.0	9.5	16
Bagobo	44.8	9	11.1	7	4.0	9.5	14
Pueblo	51.5	12	12.6	14	4.1	11	10
Moro	46.5	10	10.9	4	4.2	12	40
Tinguianes	53.2	13	12.0	9	4.4	13	10
Igorot	56.1	14	12.5	13	4.5	14	12
Negrito	71.9	15	13.0	15	5.5	15	12
African Pigmy	94.8	16	14.0	16	6.8	16	7

The most significant results in this table are, first, the fact that the White group surpasses all others, with the exception of the five Indians from Vancouver, in speed of movement; and secondly, that the Indians from the Government Schools move considerably faster than all the other Indian groups, again with this same exception. Just why these Vancouver Indians were so quick, it would be difficult to say, without knowing more about their social and educational background. If we leave them aside for the moment (as their small num-

bers entitle us to do) we obtain some corroboration for our view of the environmental determination of speed in the fact that the School Indians who have really lived for some time in a "white" environment, are so much faster than the others.

As for the speed-accuracy relationship which was found in the case of the Yakima Indians, and the Toppenish Whites, namely, that accuracy increased as speed decreased, and vice versa, there is some evidence for it in these results, though it is not quite consistent. For example, the Vancouver Indians, who move the quickest, are quite low down in the scale of errors (eighth); the same relationship holds in the case of the Patagonians, who are high on the speed list (4th) and low in the accuracy list (12th), and in the case of the Ainu; while the Eskimos, who move relatively slowly, make the fewest errors of all (together with the School Indians), and the Moros, who move very slowly (12th) do very well on the scale of errors (4th). On the other hand, the Whites and the School Indians move quickly and make few errors, while the Igorots, the Negritos, and the African Pigmies move slowly and make many errors.

However, as was pointed out in an earlier section, we cannot assume that our speed-accuracy relationship will hold, unless our groups are relatively equal, either in native intelligence, or in familiarity with the test situation, or both. In the case of many of the groups tested, there was obviously no such equality. Woodworth says "as between Whites, Indians, Eskimos, Ainus, Filipinos, and Singhalese, the average differences were small, and much overlapping occurred. As between these groups, however, and the Igorot and Negrito from the Philippines and a few reputed Pygmies from the Congo, the average differences were great, and the overlapping was small. . . . If the results could be taken at their face value, they would indicate differences in intelligence between races, giving such groups as the Pygmy and Negrito a low station as compared with most of mankind. The fairness of the test is not, however, beyond question; it may have been of a more unfamiliar sort to these wild hunting folk than to more settled groups." Whatever the cause, these groups were low in time scores, low in accuracy scores, and slow in speed of performance, so that the effect of speed upon accuracy cannot be determined in their case.

The records of the best eight groups (based upon combined ranks for time and errors) were studied in greater detail. The following table contains the *rank order* for time, errors, and speed.

<i>Group</i>	<i>Time and Errors</i>	<i>Time</i>	<i>Errors</i>	<i>Speed</i>
Whites	1	1	3	2
School Indians	2	3	1.5	3
Eskimo	3	6	1.5	6
Vancouver I.	5	2	8	1
Singhalese	5	4	6	4.5
Filipino	5	5	5	4.5
Moro	7	8	4	8
Bagobo	8	7	7	7

In this table, the Eskimo, Vancouver Indian, and Moro groups show very clearly the inverse relationship between speed and accuracy. Further, if we compare groups which are adjacent on this table, on the assumption that they are approximately equal in "intelligence," this relationship emerges quite clearly. If we compare the Whites with the School Indians, we find that the faster group has made more errors; the same holds true also for the next pair, the Eskimos and the Vancouver Indians; for the third, and for the last pair there is also a relationship, not very marked however, of the type we are discussing. On the whole, the evidence tends to support, rather than to contradict, the hypothesis.

Rank order correlations for the eight groups are as follows:

1. Between time and errors +.02
2. Between time and speed +.97
3. Between errors and speed —.08
4. Between time and errors combined, and speed +.65

The high correlation, almost perfect, between time and speed, shows how important a factor actual speed of movement is in the time scores. The absence of correlation between time and errors or moves suggests that we are measuring somewhat different factors here, and that it is impossible to infer anything about accuracy from the time scores. The negligible correlation between errors or moves and speed constitutes something of an argument against the inverse relationship between speed and accuracy; as has been shown, however, in this material the relationship seems rather to hold as regards adjacent pairs, than in the group as a whole.

3. CORRELATIONS BETWEEN MEASURES OF SPEED AND ACCURACY

The view here presented, of an inverse relation between speed and accuracy, resulting in fewer errors as speed decreases (other things being equal), is in apparent conflict with other findings. First of all, it is obvious that within any one group those who take longer over a test usually make more errors in the process. Correlations were worked out between time scores and accuracy scores on the Mare and Foal test and the Healy "A," in the case of the 100 New York White subjects, who represent a fairly homogeneous group as to age and social status. There is a product-moment correlation of $.75 \pm .0294$ with the Mare and Foal, and $.95 \pm .0066$ with the Healy. There is a very clear correspondence, therefore, between good time scores and good accuracy scores in these tests. There is not the slightest conflict between this finding, however, and the hypothesis under consideration. When we are dealing with a group which is more or less homogeneous as to culture and education, the members of which are equally anxious to complete the task quickly, and who place the same interpretation (approximately) on the instruction to do the test "as quickly as possible," the result will be a close correspondence between the two scores. When we give such tests to two groups of subjects, however, one group realizing that speed is a desideratum, and accustomed to doing things in a hurry, and the other more or less indifferent to speed, and proceeding with calm and deliberation, then, other things (viz., "general intelligence," motivation, understanding of and familiarity with the problem, etc.) being equal, the former group should finish sooner, but the latter should make fewer errors. Within either group, there will be an intimate relation between number of seconds and number of errors; the relation will probably be just about as close in the case of the Yakima Indians as in the case of the New York Whites. (As a matter of fact there is an r of $+.91$ between time scores and moves in the Healy "A" test in the case of the Yakima Indians.) But when the two groups are compared, this relation will be *inverse*. There is no contradiction here.

"Total Time" is not the same as "speed," which refers rather to the rate at which the individual move is made. The problem next arises as to the relation of speed to errors, and also of speed to total time. There may be such a thing as general alertness which is responsible for quick movement, for a short

total time and for a small number of errors. Something of this sort is suggested in an article by Peak & Boring³⁷ in which the statement is made that "speed of reaction is an important, and probably the most important, factor in individual differences in the intelligent act. These differences in speed are not due to gross distractions or irrelevant acts, but inhere in a single item of an intelligence test and probably in so simple an act as the muscular reaction." (P. 92.) With this possibility in mind, the following correlations were computed. (N = 100).

1. Between the Index of Speed in the Mare and Foal test and the time score. Pearson $r = +.77 \pm .027$. (This means that shorter times go with greater speed.)

2. Between the Index of Speed in Healy "A" and the time score. Pearson $r = .60 \pm +.0432$.

3. Between the Index of Speed (Mare and Foal) and the score for errors. Pearson $r = -.03 \pm .067$.

4. Between the Index of Speed (Healy "A") and the score for moves. Pearson $r = .46 \pm .053$. (This means that greater speed goes with smaller number of moves.)

³⁷ See Reference (56).

Note. These first two correlations are between Speed Indices (or Time divided by Moves) and Total Time. As the Speed Index increases in size, there is a marked tendency for Total Time to increase. However, a high Index means *slow* movement (because the Index is in terms of number of seconds per move), hence these high correlations mean that *slow* movement goes with *longer* Total Time (or a poor time score) and *quick* movement with *shorter* Total Time (or a good time score). The third and fourth r's are between Speed Indices and Moves (or Errors). The positive r in (4) means that there is a tendency for high Speed Indices (therefore a *slower* rate of movement) to be found in those cases in which a great many moves are needed in order to complete the tests. In other words, greater speed has a tendency to go with greater accuracy in the Healy "A" test, while there is no correlation between speed and accuracy in the case of the Mare and Foal test.

There is apparently a spurious element in these correlations. (1) and (2) are correlations between T (total time) and T/M (time divided by moves). There is a common numerator, T. This does not seem to me to make the correlation spurious. In the first place the index represents a real psychological factor, namely, the speed with which each individual move is made; this is a totally different thing from T, the total time. In the second place, if I had taken for each subject the number of moves made, say, in the first 10 seconds, I could have obtained the Speed Index by dividing that number into 10. That would have been the same index (approximately) as I obtained by dividing the total number of moves into the total time (leaving out of account slight variations in speed during the course of the test). In that case the correlation would be between T (total time) and 10/M: (10 seconds divided by number of moves in 10 seconds). This is essentially the correlation I have used; expressed in this way, there is no spurious element. It is the r between Total Time and the number of seconds required to complete one move. Similarly with (3) and (4). They are correlations apparently spurious, between T/M and M. They could just as well have been written in terms of T/5 (i.e., time required to complete five moves, divided by 5) and M, and the "spuriousness" would disappear.

There is first to be noted the rather significant correlation between speed and total time, in the case of both tests. This suggests, what might be suspected *a priori*, that the actual speed of movement is to a considerable extent responsible for the time scores, or is at least an important factor in the result.

The remaining correlations are not quite so easy to interpret. In the Mare and Foal test there is apparently no relation between speed of movement and number of errors, while in the Healy "A" test, the correlation is substantial, and too large to be explained away as due to chance factors. The explanation of this discrepancy is to be found in the nature of the two tests. In the case of Healy "A," what frequently (if not usually) happens is that after some random activity, there is "insight," i.e., the subject suddenly sees, after he has one or two pieces in place, how the other three or four will fit in. He then puts these three or four pieces in very quickly, usually much more quickly than in his earlier, more random efforts. Naturally, if this insight comes early in the trial and error process, the effect will be to make it appear that the subject worked very quickly; if it comes late, it will have little effect, because so many slower moves have gone before. The actual Index of Speed, therefore, is not merely a function of the speed of the individual movement, but of the time at which the solution took place. In the case of the Mare and Foal test, there is no such effect. Each movement is separate and independent. There is no insight needed. The later moves are not made appreciably faster than the earlier ones (with the possible exception of the very last, which may be a little faster than the others because no choice of a suitable position for it requires to be made). The correlation, therefore, between speed and errors means more in the case of the Mare and Foal test than in the case of Healy "A," and the probability is that in this type of material, and *within a homogeneous group*, there is little or no correlation between these two. To get at a proper Index of Speed in the case of Healy "A," it would be advisable to exclude the last five moves. This was not done in the present instance, as this particular aspect of the problem was not anticipated.

4. THE UNFAIRNESS OF SPEED TESTS

If speed of performance is a function of environment, and if it enters as a very important factor into intelligence ratings, it seems obviously unfair to use it as a criterion of excellence in a study of racial or group differences. Even if differences in speed are native, hereditary, their importance is purely relative, depending on the need for speed in a particular society. Speed in itself can hardly be regarded as a good, unless it performs a specific function. On the Reservation, in any non-industrialized community, in any group which stresses a peaceful and temperate existence rather than a hustling, competitive one, it has no particular virtue. As a criterion of excellence, it belongs in "white" American life, perhaps, but it is not for that reason applicable to all other communities. By so much more, then, is it an unfair criterion when, as we have good reason to believe, the differences in speed depend largely if not entirely upon training and environment.

There is one type of evidence which might be urged against this point of view, but which is really irrelevant. During the war the Army testers³⁸ studied the apparent unfairness of the speed criterion in Army Alpha by comparing the scores made during regular and during double time limits; they found a correlation of 0.965, with 510 subjects. Ruch and Koerth³⁹ repeated this experiment with freshmen at Iowa State University, and came to the following conclusions,—(1) "Admitting that Army Alpha is largely a *speed* test, the fact that single time correlates 0.966 with double time, and 0.945 with unlimited time, indicates that the speed factor does not seriously invalidate the tests. (2) Increasing the time allowances does not permit dull subjects to equal the scores of the more intelligent subjects." In a later study Ruch⁴⁰ used the Terman Group Test on younger subjects, and found that the speed factor does not seriously influence the ratings of the pupils. Other investigators report similar results. None of these findings, however, important as they may be, really touch upon our problem. It cannot be repeated too often that within the same group, homogeneous, or nearly so, as to attitude towards speed, the members of which are equally anxious to get the task done

³⁸ See Reference (52).

³⁹ See Reference (69).

⁴⁰ See Reference (70).

in a hurry, the introduction of a time criterion may be perfectly reasonable and just; when applied to groups like the Yakima Indians, or (to a lesser degree) rural southern Negroes, it becomes entirely unfair.

5. THE APPLICATION TO OTHER DATA

The part which the speed factor plays in observed differences between racial groups can be illustrated by an examination of results reported by Peterson, Lanier, and Walker.⁴¹ Three of Peterson's tests were used. In the Rational Learning Test the Whites excelled in *time* markedly and reliably ($\frac{D}{PE \text{ (diff)}} = 5.0$), and considerably on the basis of errors ($\frac{D}{PE \text{ (diff)}} = 3.0$), but there was no difference, practically, (50% overlapping) in the number of repetitions required. In the Mental Maze, the Negroes required fewer repetitions ($\frac{D}{PE \text{ (diff)}} = -2.3$), and the groups were practically equal in time and errors (50% overlapping). In the Disc Transfer Test, there is a clear and reliable superiority as regards time ($\frac{D}{PE \text{ (diff)}} = 8.6$), and a slight and unreliable one as regards moves ($\frac{D}{PE \text{ (diff)}} = 0.6$). On the average the $\frac{D}{PE \text{ (diff)}}$ is 2.0 in favor of the Whites, and the authors give this figure as representing the amount of difference between the two groups. After a report of the results in form naming and color naming, the authors conclude "the tests as a whole indicate a race difference in the speed of these serial vocal responses, the Whites being superior. How much this speed difference affects the differences usually found with timed group tests must remain an open question for the present, even though our ingenuity tests indicate that there are mental differences which are not merely due to speed." (P. 283.)

This last statement, however, hardly seems to be justified, and does not quite fit in with the authors' otherwise careful study of the speed factor. For if the average $\frac{D}{PE \text{ (diff)}}$

⁴¹ See Reference (57).

which is equal to 2.0 in favor of the Whites, is analyzed into its speed and accuracy components (which Peterson failed to do), an interesting result emerges, which is quite in harmony with the point of view adopted here. The average of *all* the $\frac{D}{PE \text{ (diff)}}$'s is equal to 2.0. The average of those $\frac{D}{PE \text{ (diff)}}$'s which refer to *time* scores is equal to 4.6,—a completely reliable difference. The average of those $\frac{D}{PE \text{ (diff)}}$'s which refer to scores for errors, moves, and repetitions is only 0.42—a slight and unreliable difference. In other words, all the superiority of the Whites lies in their better time scores; there is no superiority to speak of in their scores for accuracy. This is almost exactly the result obtained by the present writer in the case of the Negroes and Whites in New York City.

As the writers of the above article say in their introduction, "such race differences in attitude as readiness to work at one's utmost speed . . . throughout an exercise or test cannot be overlooked in mental testing, and they need much more study than they have received."

Professor Thorndike's (75) recent discussion of speed is interesting in this connection. "It is important to know the relation between level of intellect and speed for two reasons. If the relation is very close, the speed of performing tasks which all can perform would be an admirable practical measure of intellect. The record would be in time, an unimpeachable and most convenient unit. If, on the other hand, the correlation is very low, the practice of giving credit for speed in group examinations should probably be amended." (P. 400.) After discussing the findings of Dr. Hunsicker as to the relation between the time taken to complete easy problems in arithmetic, and for easy completions, and the subject's performance in harder tasks, Professor Thorndike concludes that the correlations are "so low that it seems unwise to attach much weight to speed in intelligence examinations in general," except in the case of tests where speed measures speed of learning.

VIII. CONCLUSIONS

1. There is evidence that the superiority of White over Indian and Negro children in performance tests is largely, if not entirely, a superiority in scores for *time*. There is no superiority, and in some cases an inferiority, in the scores for *accuracy* of performance.

2. There is evidence that the greater speed of performance of White children, which is responsible for the better scores for time, is more probably determined by environmental, than by racial differences.

3. There is some evidence that other racial groups are at least the equal of the Whites in the ability to learn, or to profit by experience.

4. There is no evidence for an improvement in score on the performance tests as the proportion of White blood in Negroes or Indians increases.

BIBLIOGRAPHY

1. Arlitt, A. H. On the Need for Caution in Establishing Race Norms, *Jour. of Appl. Psychol.* 1921, 5, 179-183.
2. Arlitt, A. H. The Relation of Intelligence to Age in Negro Children, *Jour. of Appl. Psychol.* 1922, 6, 378-384.
3. Arthur, G. The Relation of I.Q. to Position in Family, *Jour. of Ed. Psychol.* 1926, 17, 541-550.
4. Baldwin, B. T. The Learning of Delinquent Adolescent Girls as Shown by a Substitution Test, *Jour. of Ed. Psychol.* 1913, 4, 317-333.
5. Bere, M. A Comparative Study of the Mental Capacity of Children of Foreign Parentage, *Teachers College Contributions*, 1925, No. 154.
6. Book, W. F. *The Intelligence of High School Seniors*, N. Y. 1922.
7. Bridges, J. W. and Coler, L. E. Intelligence and Social Status, *Psychol. Rev.* 1917, 24, 1-31.
8. Burt, C. *Mental and Scholastic Tests*, London, 1921.
9. Colloton, C. and Rugg, H. Constancy of the Stanford Binet I.Q. as Shown by Retests, *Jour. of Ed. Psychol.* 1921, 12, 315-22.
10. Colvin, S. S. and Allen, R. D. Mental Tests and Linguistic Ability, *Jour. of Ed. Psychol.* 1913, 14, 1-20.
11. Colvin, S. S. *The Learning Process*, 1923.
12. Dashiell, J. F. and Glenn, W. D. A Re-examination of a Socially Composite Group with Binet and with Performance Tests, *Jour. of Ed. Psychol.* 1925, 16, 335-340.
13. Decroly, O. and Degand, J. La Mesure de l'Intelligence chez les enfants normaux d'après les tests de Binet et Simon, *Arch. de Psychol.* 1910, 9, 81-108.
14. Derrick, S. M. A Comparative Study of the Intelligence of 75 White and 55 Colored College Students by the Stanford Revision of the Binet-Simon Scale, *Jour. of Appl. Psychol.* 1920, 4, 316-329.
15. DuBois, E. F. *Basal Metabolism in Health and Disease*, Second Edition, 1927.
16. Duff, J. F. and Thomson, G. H. The Social and Geographical Distribution of Intelligence in Northumberland, *Br. Jour. of Psychol.* 1923, 14, 192-198.
17. Feingold, G. A. Intelligence of the First Generation of Immigrant Groups, *Jour. of Ed. Psychol.* 1924, 15, 65-82.
18. Ferguson, G. O. The Psychology of the Negro, *Archives of Psychol.* 1916, No. 36.
19. Fitzgerald, J. A. and Ludeman, W. W. The Intelligence of Indian Children, *Jour. of Comp. Psychol.* 1926, 6, 319-328.
20. Freeman, F. M. *Mental Tests*, 1926.
21. Fukuda, T. A Survey of the Intelligence and Environment of School Children, *Am. Jour. Psychol.* 1925, 36, 124-139.
22. Garrett, H. E. *Statistics in Psychology and Education*, 1926.
23. Garth, T. R. White, Indian, and Negro Work Curves, *Jour. of Appl. Psychol.* 1921, 5, 14-25.
24. Garth, T. R. The Results of Some Tests on Full and Mixed Blood Indians, *J. of Appl. Psychol.* 1921, 5, 359-372.
25. Garth, T. R. A Comparison of Mental Abilities of Mixed and Full Blood Indians on a Basis of Education, *Psychol. Rev.* 1922, 29, 221-236.
26. Garth, T. R. The Problem of Racial Psychology, *Jour. of Abn. & Soc. Psychol.* 1922-23, 17, 215-219.
27. Garth, T. R. A Comparison of the Intelligence of Mexican and Mixed and Full Blood Indian Children, *Psychol. Rev.* 1923, 30, 338-401.

28. Garth, T. R. A Review of Racial Psychology, *Psychol. Bull.* 1925, 22, 343-364.
30. Garth, T. R. The Intelligence of Full Blood Indians, *Jour. of Appl. Psychol.* 1925, 9, 382-389.
31. Garth, T. R. and Whatley, C. A. Intelligence of Southern Negro Children, 1925, 22, 501-504.
32. Garth, T. R. The Intelligence of Mixed Blood Indians, *Psychol. Bull.* 1927, 24, 179-180.
33. Goodenough, F. L. Racial Differences in the Intelligence of School Children, *Jour. of Comp. Psychol.* 1926, 6, 319-328.
34. Graham, V. T. The Intelligence of Italian and Jewish Children in the Habit Clinics of the Massachusetts Division of Mental Hygiene, *Jour. Abn. & Soc. Psychol.* 1926, 20, 371-376.
35. Graham, V. T. Health Studies of Negro Children, Atlanta, Ga. Pub. Health Report 1926, 2757-2783, Rep. No. 1127, 1927.
36. Gray, P. L. and Marsden, R. E. The Constancy of the I.Q. Br. *Jour. Psychol.* 1924-25, 15, 169-173.
37. Gregg, J. E. The Comparison of Races, *Sc. Monthly*, 1925, 20, 248-54.
38. Haggerty, M. E. and Nash, A. B. Mental Capacity of Children and Paternal Occupation, *Jour. Ed. Psychol.* 1924, 15, 559-572.
39. Helmer V. The American Indian and Mental Tests, Unpublished Masters Thesis, Univ. of Kansas, 1926.
40. Herskovits, M. J. On the Relation between Negro-White Mixture and Standing in Intelligence Tests, *Pedagogical Seminary & Jour. Genetic Psychol.* 1926, 33, No. 1, 30-42.
- 40a. Hirsch, N. D. M. A Study of Natio-Racial Mental Differences. *Genetic Psychology Monographs*. Vol. 1. Nos. 3 and 4. 1926.
41. Hoffman, A. Vergleichende Intelligenzprüfungen an Vorschülern und Volksschülern, *Ztsch. f. Angew. Psychol.* 1914, 8, 102-20.
42. Hull, C. The Computation of Pearson's r from Ranked Data, *Jour. Appl. Psychol.* 1922, 384-390.
43. Hunter, W. S. and Sommermier, E. The Relation of Degree of Indian Blood to Score on the Otis Intelligence Test, *Jour. Comp. Psychol.* 1922, 2, 257-277.
44. Johnson, B. and Schriefer, L. A Comparison of Mental Age Scores Obtained by Performance Tests and the Stanford Revision of the Binet-Simon Scale, *Jour. Ed. Psychol.* 1922, 13, 408-417.
45. Johnson, O. J. A Study of the Relation between Ability to Learn and Intelligence as Measured by Tests, *Jour. Ed. Psychol.* 1923, 14, 540-544.
46. Kirahara, H. Development of Intelligence and Social Factors (Study in the Science of Labor 1, No. 2). See *Psychol. Abstracts* 1, p. 109, 1927.
47. MacDonald, H. The Social Distribution of Intelligence on the Isle of Wight, *Br. Jour. Psychol.* 1925-26, 16, 123-129.
48. MacLeod, G., Crofts, E. E., Benedict, F. G. The Basal Metabolism of Some Orientals. *Am. Jour. Physiol.* 1925, 73, 449-462.
49. Madox, C. R. Unpublished Masters Thesis. See *Freeman, Mental Tests*, p. 470.
50. Mayo, M. J. The Mental Capacity of the Negro, *Archives of Psychol.* No. 33, 1915.
51. Mead, M. Group Intelligence Tests and Linguistic Disability Among Italian Children, *School and Society*, 25, April 16, 1927.
52. *Memoirs National Academy of Sciences, Psychological Examining in the U. S. Army*, Edited by R. M. Yerkes, 1921.
53. Morlé, M. L'Influence de l'état Social sur le Degré de l'Intelligence des Enfants, *Bull. Soc. Libre Educ. Psychol. de l'enfant*, 1911, 12, 8-15.

54. Murdoch, K. A Study of Differences Found between Races in Intellect and in Morality, *School & Society* 125, 22, 628-32, 659-64.
55. Paschal, F. C. and Sullivan, L. R. Racial Influences in the Mental and Physical Development of Mexican Children, *Comp. Psychol. Mono.* 1925, 3, No. 14, 1-76.
56. Peak, H. and Boring, E. R. The Factor of Speed in Intelligence, *Jour. Exp. Psychol.* 1926, 9, 71-94.
57. Peterson, J., Lanier, L. H. and Walker, H. M. Comparisons of White and Negro Children in Certain Ingenuity and Speed Tests, *Jour. Comp. Psychol.* 1925, 5, 271-284.
58. Phillips, B. A. The Binet Tests Applied to Colored Children, *Psychol. Clin.* 1914, 8, 190-196.
59. Phillips, B. A. American Education. Vol. XXVI, 1922, p. 61. Quoted by Colvin and Brown.
60. Pintner, R. and Paterson, D. G. A Manual of Performance Tests, 1921.
61. Pintner, R. and Keller, R. Intelligence Tests of Foreign Children, *Jour. Ed. Psychol.* 1922, 13, 214-222.
62. Pintner, R. Comparison of American and Foreign Children on Intelligence Tests, *Jour. Ed. Psychol.* 1923, 14, 292-295.
63. Porteus, S. D. Temperament and Mentality in Maturity, Sex and Race, *Jour. Appl. Psychol.* 1924, 8, 57-74.
64. Pressey, L. W. The Influence of (a) Inadequate Schooling and (b) Poor Environment upon Results with Tests of Intelligence, *Jour. Appl. Psychol.* 1920, 4, 91-96.
65. Pressey, S. L. and Thomas, J. B. A Study of Country Children in (1) a Good and (2) a Poor Farming District by Means of a Group Scale of Intelligence, *Jour. Appl. Psychol.* 1919, 3, 283-86.
66. Pressey, S. L. and Ralston, R. The Relation of and General Intelligence of School Children to the Occupation of Their Fathers, *Jour. Appl. Psychol.* 1919, 3, 366-373.
67. Pyle, W. H. Mentality of the Negro Compared with Whites, *Psychol. Bull.* 1915, 12, 71.
68. Pyle, W. H. The Learning Capacity of Negro Children, *Psychol. Bull.* 1916, 13, 82-83.
69. Ruch, G. M. and Koerth, W. "Power" vs. "Speed" in Army Alpha, *Jour. Ed. Psychol.* 1923, 14, 193-208.
70. Ruch, G. M. The Speed Factor in Mental Measurements, *Jour. Ed. Res.* 1924, 9, 39-45.
71. Sandiford P. and Kerr, R. Intelligence of Chinese and Japanese Children, *Jour. Ed. Psychol.* 1926, 17, 361-367.
72. Stoddard, G. T. Discussion of Kincaid's Results, *Psychol. Rev.* 1925, 32, 479-485.
73. Sunne, D. Comparison of White and Negro Children in Verbal and Non-Verbal Tests, *School and Society*, 1924, 19, 469.
74. Terman, L. M. Genetic Studies of Genius, Stanford Univ. 1925.
75. Thorndike, E. L. The Measurement of Intelligence, 1926.
76. Todd, T. W. and von Gorder, L. The Quantitative Determination of Black Pigmentation in the Skin of the American Negro, *Amer. Jour. Physical Anthropology*, Vol. 4, No. 3, pp. 239-260.
77. Walters, F. C. Language Handicap and the Stanford Revision of the Binet-Simon Tests, *Jour. Ed. Psychol.* 1924, 15, 276-284.
78. Wang, S. L. A Demonstration of the Language Difficulty Involved in Comparing Racial Groups by Means of Verbal Intelligence Tests, *Jour. Appl. Psychol.* 1926, 10, 102-6.
79. Wechsler, D. On the Influence of Education on Intelligence as Measured by the Binet-Simon Tests, *Jour. Ed. Psychol.* 1926, 17, 248-257.

80. Weintrob, J. and R. The Influence of Environment on Mental Ability as Shown by Binet-Simon Tests, *Jour. Ed. Psychol.* 1912, 3, 577-583.
81. Wells, G. R. The Application of the Binet-Simon Tests to White and Colored School Children. *Psychol. Mono.*, 1923, 32, No. 3, 52-58.
82. Woodworth, R. S. Racial Differences in Mental Traits. *Science*, 1910, N. S., 31, 171-186.
83. Woodworth, R. S. Comparative Psychology of Races. *Psychol. Bull.*, 1916, 13, 388-396.
84. Yerkes, R. M., and Anderson, H. The Importance of Social Status as Indicated by the Results of the Point Scale Method of Measuring Mental Capacity. *Jour. Ed. Psychol.*, 1915, 6, 137-150.

BF 21.A7 no93



3 9358 00040942 2



3 9358 00040942 2

DIRECTORY OF AMERICAN PSYCHOLOGICAL PERIODICALS

- AMERICAN JOURNAL OF PSYCHOLOGY**—Ithaca, N. Y.; Cornell University.
Subscription \$6.50. 624 pages ann. Edited by M. F. Washburn, K. M. Dallenbach, M. Bentley and E. G. Boring. Quarterly. General and experimental psychology. Founded 1887.
- THE PEDAGOGICAL SEMINARY AND JOURNAL OF GENETIC PSYCHOLOGY**—Worcester, Mass.; Clark University Press. Subscription \$7.00. 700 pages ann. Edited by Carl Murchison and an international cooperating board. Quarterly. Child behavior differential and genetic psychology. Founded 1891.
- PSYCHOLOGICAL REVIEW**—Princeton, N. J.; Psychological Review Company.
Subscription \$5.00. 480 pages annually.
Bi-monthly. General. Founded 1894. Edited by Howard C. Warren and John B. Watson.
- PSYCHOLOGICAL MONOGRAPHS**—Princeton, N. J.; Psychological Review Company.
Subscription \$6.00 per vol. 500 pp. Founded 1895. Edited by Shepherd I. Franz.
Published without fixed dates, each issue one or more researches.
- PSYCHOLOGICAL INDEX**—Princeton, N. J.; Psychological Review Company.
Subscription \$2.00. 200 pp. Founded 1895. Edited by Walter S. Hunter.
An annual bibliography of psychological literature.
- PSYCHOLOGICAL BULLETIN**—Princeton, N. J.; Psychological Review Company.
Subscription \$5.50. 720 pages annually. Psychological literature.
Monthly. Founded 1904. Edited by Samuel W. Fernberger.
- JOURNAL OF PHILOSOPHY**—New York; 515 W. 116th St.
Subscription \$4.00. 728 pages per volume. Founded 1904.
Bi-weekly. Edited by F. J. E. Woodbridge, Wendell T. Bush and H. W. Schneider.
- TRAINING SCHOOL BULLETIN**—Vineland, N. J.; The Training School.
Subscription \$1.00. 160 pages ann. Edited by E. R. Johnstone. Founded 1904.
Monthly (10 numbers). Psychology and training of defectives.
- ARCHIVES OF PSYCHOLOGY**—Columbia University, N. Y.; Archives of Psychology.
Subscription \$6.00. 500 pp. per vol. Founded 1906. Edited by R. S. Woodworth.
Published without fixed dates, each number a single experimental study.
- JOURNAL OF ABNORMAL AND SOCIAL PSYCHOLOGY**—Albany, N. Y.
Sub. \$5.00. Boyd Printing Co. Edited by Morton Prince, in cooperation with Floyd H. Allport.
Quarterly. 432 pages annually. Founded 1906. Abnormal and social.
- PSYCHOLOGICAL CLINIC**—Philadelphia; Psychological Clinic Press.
Subscription \$2.50. 288 pages. Edited by Lightner Witmer. Founded 1907.
Without fixed dates (9 numbers). Orthogenics, psychology, hygiene.
- COMPARATIVE PSYCHOLOGY MONOGRAPHS**—Baltimore; Williams and Wilkins Co.
Subscription \$5.00. 500 pages per volume. Edited by W. S. Hunter.
Published without fixed dates, each number a single research.
- PSYCHOANALYTIC REVIEW**—Washington, D. C.; 3617 10th St., N. W.
Subscription \$6.00. 500 pages annually. Psychoanalysis.
Quarterly. Founded 1913. Edited by W. A. White and S. E. Jelliffe.
- JOURNAL OF EXPERIMENTAL PSYCHOLOGY**—Princeton, N. J.; Psychological Review Company.
Subscription \$5.00. 480 pages annually. Experimental.
Bi-monthly. Founded 1916. Edited by Madison Bentley.
- JOURNAL OF APPLIED PSYCHOLOGY**—Bloomington, Ind.; Indiana University Press.
Subscription \$4.00. 400 pages annually. Founded 1917.
Quarterly. Edited by James P. Porter and William F. Book.
- JOURNAL OF COMPARATIVE PSYCHOLOGY**—Baltimore; Williams and Wilkins Company.
Subscription \$5.00. 500 pages annually. Founded 1921.
Bi-monthly. Edited by Knight Dunlap and Robert M. Yerkes.
- GENETIC PSYCHOLOGY MONOGRAPHS**—Worcester, Mass.; Clark University Press. Subscription \$7.00 per volume. Two volumes per year, 600 pages each. Edited by Carl Murchison and an international cooperating board. Monthly. Each number one complete research. Child behavior, differential and genetic psychology. Founded 1925.
- PSYCHOLOGICAL ABSTRACTS**—Princeton, N. J.; American Psychological Association.
Subscription \$6.00. 600 pages annually. Edited by W. S. Hunter.
Monthly. Abstracts of Psychological literature. Founded 1927.
- THE PERSONNEL JOURNAL**—Baltimore; William and Wilkins Co.
Subscription \$5.00. 500 pp. Founded 1922.
Bi-monthly. Edited by Walter V. Bingham.
- JOURNAL OF GENERAL PSYCHOLOGY**—Worcester, Mass.; Clark University Press. Subscription \$7.00. 600-700 pages annually. Edited by Carl Murchison and an international cooperating board. Quarterly. Experimental, theoretical, clinical, and historical psychology. Founded 1927.
- ARCHIVES OF PSYCHOANALYSIS**—New York; 2 East 65th St. Subscription \$20.00. 1000 pages ann. Ed. by L. Pierce Clark. Quarterly. Detailed analyses of cases of narcissistic neuroses and psychoses showing psychoanalytic technic. Foreign abstracts and translations.